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A Brief Review of the Snakes of Costa Rica

BY

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ABSTRACT: The snakes of Costa Rica are reviewed, largely on the basis a collection made by the author in Costa Rica in 1947. Synopses of all known species are given and keys are added. The fauna as listed consists of 56 genera, and 132 species and subspecies are recognized. The following forms are described as new; *Nothopsis torresi, Dipsas costaricensis, Pliocercus annellatus, Micrurus pachecoi, and Micrurus alleni richardi.*

INTRODUCTION

Early in June, 1947, at the instigation of Professor Reubén Torres Rojas, of Cartago, Costa Rica, I received an invitation from the Rector of the National University of Costa Rica to spend the summer of 1947 studying the herpetological faunas in that country. The welcome invitation was promptly accepted and after hasty preparations, I was ready to leave for Costa Rica on June 18. I was joined at this time by Richard C. Taylor, likewise bent on making a herpetological collection in Costa Rica. After an uneventful air journey we arrived on June 21. Three days were involved in getting the equipment through customs and in obtaining the required permits. The first day of collecting was June 24.

From this date until September 7, the greater part of the time was spent in the field. Faunas of four principal areas were sampled. These were: Turrialba and its immediate surroundings, in the eastern part of the plateau region; Isla Bonita, on the eastern slope of Volcán Poás; the summit and western slopes of Cerro de la Muerte; and Los Diamantes, in the eastern lowlands. A few other localities were visited for shorter periods and of course less representative collections were obtained than were taken in the aforementioned places.

Considerable rain fell during these months, hampering collecting and causing the loss of many man-hours to the collecting work. The journey to the Pacific lowlands on the west slope of Cerro de la Muerte was a pleasant exception. However, due to the fact that this region was dry, collecting was poorer than in other localities visited.

The night collecting everywhere was especially profitable, and a part of practically every night provided its increment to the collection. Collecting at high elevation on Mt. Irazú and Cerro de la Muerte was hampered considerably by fog and rain coupled with the low temperatures of these high peaks. Aside from driving the animals under cover, it likewise did much to render the collector inactive.

While the greatest number of novelties is present in the amphibian collection, certain forms among the snakes seem to merit new designations, and they are given herein.

The collection of snakes from the four principal areas are as follows. The number of species, in a measure, represents the length of time spent in collecting in each place.

Turrialba and surroundings

Constrictor constrictor imperator
Nothopsis torresi sp. nov.
Geophis hoffmanni
Geophis dolichocephala
Xenodon bertholdi
Dipsas costaricensis sp. nov.
Pliocercus annellatus sp. nov.
Rhadinaea d. decorata
Drymarchon corais melanurus
Drymobius m. margaritiferus
Drymobius rhombifer
Pseustes shropshirei
Pseustes poecilonotus chrysobronchus
Spilotes p. pullatus
Erythrolamprus bizonus
Leptodeira a. annulata
Imantodes cenchoa semifasciatus
Tantilla shistosa
Tantilla annulata
Micrurus nigrocinctus mosquitensis
Micrurus mipartitus multifasciatus
Bothrops n. nummifer
Bothrops schlegelii (nigroadspersus)
Bothrops lansbergii

Isla Bonita, Volcán Poás

Ninia oxynota
Dipsas annulata
Chironius carinatus
Chironius grandisquamis
Lampropeltis doliata micropholis
Leimadophis taeniurus juvenilis
Imantodes cenchoa semifascitatus
Imantodes inornatus
Clelia c. clelia
Bothrops picadoi
Bothrops lateralis

San Isidro El General

Geophis hoffmanni
Lampropeltis doliata micropholis
Coniophanes fissidens punctigulgaris
Dryadophis melanolomus alternatus
Clelia petolarius
Xenodon colubrinus

(Boquete camp)

Bothrops n. nigrovirdis
Micrurus n. nigrocinctus
Ninia maculata

Los Diamantes

Ninia tessellata
Trimetopon pliolepis
Enulius sclateri
Leptodeira a. annulata
Oxybelis brevirostris
Coniophanes fissidens punctigularis
Micrurus alleni richardi sp. nov.
Micrurus nigrocinctus mosquitensis
Bothrops atrox

Miscellaneous Localities

Peralta, 300 m.

Thalerophis depressirostris

Cervantes

Ninia maculata

Cartago

Thamnophis sirtalis chalceus

Santa Cruz on Volcán Turrialba, 6500 ft.

Bothrops lateralis
Geophis brachycephala
Geophis hoffmanni

PLAN OF WORK

One of the anticipated results of my acceptance of the invitation to study in Costa Rica was the preparation of a work that might present my findings, and at the same time serve as a primary text for study and identification of the Costa Rican herpetological fauna. No such work, purporting to fill such a purpose, has been prepared for that country. The works of Dr. C. Picado (1931) and Señor Carlos Viquez (1935, 1941) have dealt with only a limited part of the snake fauna. The older work of Cope in 1875 listed the known fauna but many species appear merely as names.

In consequence I have included for each species and subspecies, regarded as having a valid place in the Costa Rican faunal list, a description of an individual specimen or a brief description drawn from the scattered literature. Keys are added to assist in identification. No attempt is made to include an exhaustive treatment of

synonymies. Usually the earliest reference is recorded and one or more others giving a report of the species in Costa Rica.

I contemplate the preparation of two other papers, one dealing with the remaining reptiles (crocodilians, turtles and lizards) and the other treating of the amphibians. Already certain short papers have appeared describing new frogs, salamanders, and lizards.

The half-tone illustrations presented are from photographs made from preserved specimens submerged in water. The drawings are the work of Miss Thespa Stapoulis.

This study is based primarily on two lots of Costa Rican snakes now in the Museum of Natural History of the University of Kansas. The first is that obtained by the Hall, Camp and Westman Costa Rican Expedition of 1947. The second is that obtained by me either by gift, purchase or collecting the same year. I have also had at hand the collection made by Richard C. Taylor who has allowed me the privilege of studying it. I have had access to most of the snakes from Costa Rica now in the Museum of Comparative Zoology, Harvard College, and those in the United States National Museum of Washington, at which institutions I spent some time in the summers of 1948 and 1949. I have likewise found occasion to examine certain specimens in the Museum of Zoology University of Michigan, Chicago Natural History Museum, The Academy of Natural Sciences of Philadelphia and The American Museum of Natural History. I desire to express my thanks especially to Mr. A. Loveridge of Harvard, and Dr. Doris Cochran of the National Museum for their many courtesies while I was studying in these institutions, and to the directors and curators of other collections for their kindness in making available certain specimens.

Specimens from the various collections are referred to in this paper under the following initials:

A. M. N. H. . . . . American Museum of Natural History
A. N. S. P. . . . . Academy of Natural Sciences of Philadelphia
C. N. H. M. . . . . Chicago Natural History Museum
EHT-HMS . . . . . Edward H. Taylor-Hobart M. Smith collection
M. C. Z. . . . . Museum of Comparative Zoology of Harvard College
M. Z. U. M. . . . . Museum of Zoology, University of Michigan
M. N. H. . . . . Museum of Natural History, University of Kansas
R. C. T. . . . . Richard C. Taylor collection
U. S. N. M. . . . . United States National Museum.

HISTORY OF COLLECTIONS AND LITERATURE

The first considerable collection of Costa Rican snakes made by Dr. Carl Hoffmann, in Costa Rica prior to 1859 and forwarded to

the Royal Zoological Museum in Berlin, formed the basis of a report by Prof. W. Peters* in 1859. The paper contained a listing of the following 21 snakes. Eighteen of the snakes were of species previously described from neighboring countries. Three were described as new. (The original nomenclature is used):

Colobognathus Hoffmannii nov. gen. et sp.
Hydromorphus concolor nov. gen. et sp.
Bothriechis nigroviridis nov. gen. et sp.
Streptophorus Sebae Duméril, Bibron, and Duméril
Herpetrodryas Boddaertii Schlegel [Sentzen]
Herpetodryas Rappii Günther
Spilotes melanurus Schlegel
Spilotes variabilis Merrem
Leptophis ahaetulla Linné
Leptophis margaritifer Schlegel
Liophis cobella Linné
Homalocranium melanocephalum Duméril, Bibron and Duméril
Oxybelis Catisbyi Schlegel
Oxybelis aeneus Wagler
Erythrolamprus venustissimus Wied
Dipsas annulata Linné
Himantodes cenchoa Linné
Hydrophis bicolor Daudin
Elaps semipartitus Duméril, Bibron and Duméril
Elaps circinalis Duméril, Bibron and Duméril
Bothrops bilineatus Wied

The specimens do not have the exact localities reported with the exception of *Oxybelis aeneus* ("Candalariogebirge und Punta de Arenas"), *Hydrophis bicolor* from "Gulfo dulce," *Bothrops bilineatus* and *Bothriechis nigroviridis* (Volcán Barba).

In 1861 Peters† described *Typhlops (Helminthophis) frontalis* from a specimen collected by Dr. Carl Hoffmann and forwarded to Germany after his death, by Dr. von Frantzius.

Some 12 years after Peters' first report, a herpetological collection made chiefly in the region about San José, Costa Rica by Dr. Van Patten, reached Edward D. Cope ‡ at Philadelphia. Thirty-three species of snakes were represented in the collection. The following new species were described: *Colobognathus dolichocephalus, Colobognathus brachycephalus* and *Rhadinaea serperastra.*

Besides these three the following were included:

Candisona durissa Linnaeus
Bothrops atrox Linnaeus
Bothriechis nigroviridis Peters
Bothriechis affinis Bocourt
Elaps nigrocinctus Girard
Elaps ornatissimus Jan (var.)
Elaps multifasciatus Jan
Pelamis bicolor Daudin
Dryiophis brevirostris Cope
Dryiophis acuminatus Wied
Thrasops ? mexicanus Duméril, Bibron and Duméril
Leptognathus nebulatus Linnaeus
Dipsas gemmistratus Cope

* Monatsb. König. Akad. Wiss. Berlin, 1859, pp. 275-278.

† Monatsb. Akad. Wiss. Berlin, Oct. 1860 (1861), pp. 517-521.

‡ Ninth Contribution to the Herpetology of Tropical America, Proc. Acad. Nat. Sci. Philadelphia, 1871, pp. 200-224.

Leptodeira annulata var.
Leptodeira annulata var.
Masticophis margaritiferus Schlegel
Masticophis boddaertii Schlegel
Herpetodryas carinatus Linnaeus
Spilotes melanurus Duméril, Bibron and Duméril
Liophis epinephelus Cope
Coniophanes fissidens Günther
Conophis lineatus Duméril, Bibron and Duméril
Erythrolamprus venustissimus Linnaeus
Tantilla melanocephala Linnaeus
Tantilla melanocephala Linnaeus (var.)
Stenorhina ventralis Duméril, Bibron and Duméril
Stenorhina degenhardtii Berthold
Ninia maculata Peters
Ninia atrata Hallowell
Colobognathus hoffmannii Peters
Epicrates cenchria Linnaeus

Eight or nine, perhaps more, of the Van Patten species duplicate specimens collected by Hoffmann. One of the species listed in this paper as *Tantilla melanocephala* variety, is later described as *Tantilla armillata sp. nov.**

William Gabb of Philadelphia, under the auspices of the Government of Costa Rica, made a second important collection in southeastern and southern Costa Rica east of the Cordillera de Talamanca and on Pico Blanco (3565 m.), one of the highest peaks of the range. This collection was much more extensive than that made by Dr. Van Patten. It contained five turtles, 19 lizards, 35 serpents and 30 amphibians with a total of 37 forms presumably new to science. In the paper * in which Cope reported the collection, sixty species and/or subspecies of serpents are listed; of these 35 were represented in the Gabb collection. The remaining 25 forms were either in the Van Patten collection or from a small collection sent from Costa Rica by Mr. Riotte; or they were specimens listed or reported by other authors. Thirteen species are described as new. The list follows:

Helminthophis frontalis Peters
Xiphosoma annulatum sp. nov.
Boa imperator Daudin
Leptognathus annulata Günther
Leptognathus argus sp. nov.
Leptognathus pictiventris sp. nov.
Leptognathus nebulata Linnaeus
Dipsas cenchoa Linnaeus
Sibon annulatum Linnaeus
Oxyrrhopus plumbeus Wied
Oxyrrhopus petolarius Linnaeus
Dryiophis brevirostris Cope
Dryiophis acuminatus Wied
Leptophis aeruginosus sp. nov.
Leptophis saturatus sp. nov.
Leptophis praestans Cope
Dendrophidium melanotropis sp. nov.
Drymobius margaritiferus Schlegel
Drymobius boddaertii Sentzen
Herpetodryas carinatus Linnaeus
Herpetodryas grandisquamis Peters
Spilotes pullatus Linnaeus
Spilotes corais melanurus Duméril Bibron and Duméril
Spilotes chrysobronchus sp. nov.
Coniophanes fissidens Günther
Pliocercus dimidiatus Cope
Rhadinaea decorata Günther
Rhadinaea serperastra Cope
Erythrolamprus venustissimus Wied

* Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), pp. 128-152.

Xenodon angustirostris Peters
Stenorhina ventralis Duméril, Bibron and Duméril
Tantilla armillata sp. nov. (from Van Patten Coll.)
Microdromus virgatus Günther
Ninia sebae tessellatus Cope
Contia pachyura sp. nov.
Contia calligaster sp. nov.
Catostoma psephotum sp. nov.
Colobognathus hoffmannii Peters
Elaps circinalis Duméril, Bibron and Duméril
Teleurapsis schlegelii Berthold
Bothriechis nigroviridis Peters
Bothriechis lateralis Peters
Bothriechis affinis Boucourt
Bothriopsis proboscideus sp. nov.
Bothrops atrox Linnaeus
Lachesis stenophrys sp. nov.

A collection sent to Edward D. Cope from Costa Rica by Sr. Don José Zeledón was reported upon by Cope in 1879.* Three snakes not previously listed from Costa Rica appear: *Scolecophis zonatus* Hallowell, *Coluber triaspis* Cope, and *Porthidium nasutum* Bocourt.

Cope, in 1893† received and reported on a collection of reptiles and amphibians from Mr. George K. Cherrie of San José, Costa Rica, among which were three new species. In the following list the first six species had not been previously listed for Costa Rica.

Rhadinaea ignita Cope
Drymobius rhombifer Peters
Drymobius caeruleus Fischer
Drymobius percarinatus sp. nov.
Synchalinus corrallioides gen. et sp. nov.
Sibon septentrionale rubricatum subsp. nov.
Colobognathus hoffmannii Peters
Oxybelis acuminata Wied
Elaps nigrocinctus Girard

In 1894 Cope ‡ reports on a series of specimens from the Museo Nacional de Costa Rica. The following are listed, four of which are new.

Trimetopon pliolepis sp. nov.
Drymobius paucicarinatus sp. nov.
Leptophis ultramarinus sp. nov.
Pogonaspis ruficeps sp. nov.
Enulius torquatus Günther

In Otto Wettstein's "Ergebnisse der österreichischen Costa Rica-Expedition 1930; Die Amphibien und Reptilien,"¶ the following snakes are listed as follows:

Leptotyphlops (= *Glauconia*) *albifrons* Wagler
Boa (= *Corallus*) *annulata* Cope
Sibynophis (= *Polyodontophis*) *venustissimus* Günther
Drymobius (*Eudryas*) *boddaertii* Sentzen
Drymobius (*Drymobius*) *margaritiferus* Schlegel
Spilotes pullatus pullatus Linnaeus
Drymarchon corais melanurus Duméril and Bibron
Chironius (= *Herpetodryas*) *fuscus grandisquamis* Peters
Leptophis mexicanus Duméril and Bibron

* Amer. Philos. Soc., vol. 18, no. 104, Aug. 11, 1879.
† Cope, Amer. Philos. Soc., 1893, p. 333.
‡ Proc. Acad. Nat. Sci. Philadelphia, 1894, pp. 194-206.
¶ Sitz, Akad. Wiss. Wien, Math.-Naturw. Kl. Abt. 1. Bd. 143, Heft 1-2, 1934, pp. 1-39.

Leptophis occidentalis occidentalis Günther
Leptophis bilineatus Günther
Liophis (= *Rhadinaea*) *cobella* Linnaeus
Liophis (= *Rhadinaea*) *pulveriventris* Boulenger
Ophis (= *Xenodon*) *colubrinus* Günther
Urotheca elapoides Cope
Catostoma (= *Geophis* = *Dirosema*) *brachycephala* Cope
Imantodes cenchoa Linnaeus
Leptodeira ocellata Günther (= *L. annulata personata* Cope)
Clelia (= *Oxyrhopus*) *cloelia* Daudin
Erythrolamprus aesculapii Linnaeus
Coniophanes (= *Erythrolamprus*) *imperialis imperialis* Baird and Girard
Tantilla (= *Homalocranium*) *virgata* Günther
Stenorhina degenhardtii Berthold
Micrurus (= *Elaps*) *mipartitus multifasciatus* Jan
Micrurus (= *Elaps*) *nigrocinctus nigrocinctus* Girard
Bothrops nasuta Bocourt (Amaral)
Bothrops nigroviridis nigroviridus Peters
Bothrops ophryomegas Bocourt (Amaral)
Bothrops schlegelii Berthold
Crotalus terrificus durissus Cope

In 1887 Cope in his "Catalogue of the Batrachians and Reptiles of Central America and Mexico" listed the herpetological fauna of Central America known at that time. The names of some 67 species and subspecies of snakes are given as occurring in Costa Rica. Certain of these names are now regarded as synonyms of others in the list, as for example, *Phylothamnus aeruginosus* Cope, *Leptophis bilineatus* Günther and *Hapsidophrys saturatus* (Cope) are placed now in the synonymy of *Thalerophis depressirostris* (Cope) by Dr. James A. Oliver, the latest reviewer of this group of colubrine snakes.

Between April 1893, and October 1895, the section of the "Biologia Centrali-Americana" dealing with Serpentes was published by Günther. Approximately 76 forms are reported for Costa Rica. This is one of the most significant works dealing with Central American Faunas, and it contains numerous excellent illustrations. The collections in the British Museum form the basis for this work.

Another work of even more importance for the study of Central American snakes is the great "Études sur les Reptiles;" Mission Scientifique au Mexique et dans l'Amérique Centrale. The livraisons nos. 8-17 dealing with the serpent fauna appeared between 1882 and 1909. The first 8 livraisons (nos. 8-15) were under the authorship of Fermin Bocourt, the last two (nos. 16-17) were written by Dr. F. Mocquard. This work contains hundreds of excellent

figures. Many Costa Rican specimens are listed. The collections treated in this work were primarily those of the Paris Museum, especially those obtained by the Mission Scientifique. However, specimens from other museums are included.

From 1893-1896 the Catalogues of the Snakes in the British Museum vols. I-III appeared and here again Costa Rican forms in the British Museum are listed.

From 1896 to 1920, nearly a quarter of a century, little was published that dealt directly with Costa Rican herpetological faunas. In the latter year E. R. Dunn, then collecting for Harvard University was sent to Costa Rica. This marked a beginning of renewed interest in this area. Later, other journeys were made by him to Central America, and one or more other visits were made to Costa Rica. No detailed reports of these collections have been made, but a few forms from Costa Rica have been described from these or other collections, among which may be mentioned are:

Thalerophis nebulosus Oliver
Lampropeltis triangulum gaigae Dunn
Leimadophis epinephelus juvenilis Dunn
Trimetopon viquezi Dunn
Trimetopon simile Dunn
Rhadinaea persimilis Dunn
Dipsas ruthveni Barbour and Dunn
Rhinobothryum bovallii Andersson
Conophis nevermanni Dunn
Trimeresurus picadoi Dunn

Three works by Costa Rican authors dealing in part with the herpetological faunas are: "Serpientes venenosas de Costa Rica sus veninos seroterapia anti-ofidica" (1931) by C. Picado T. This treats of the various species of the poisonous genera *Lachesis, Bothrops, Crotalus, Micrurus* and *Pelamis.* Numerous good illustrations of these species are given. A few harmless species are figured that seem to mimic the poisonous forms.

The other works are "Animales Venenosos de Costa Rica" (1935) by Lic. Carlos Viquez S. and "Nuestros Animales Venenosos" (1941) by the same author. The second book is in the nature of a second edition of the first; but it is rewritten and revised with many new figures added and it may be regarded essentially as a new work. One of the features is a listing of the known snake species from Costa Rica, compiled from literature. The list contains 113 names. This number must be reduced by approximately a dozen names that are synonyms or repetitions. Maps showing distribution of a few forms are given.

GEOGRAPHICAL AND CLIMATIC CONSIDERATIONS

The country of Costa Rica, lying as it does athwart the tenuous land mass that is Central America, has a fauna reflecting in great measure the spread of forms from the continental part of North America (Mexico) and from South America. It has served as a portion of the roadway along which have settled many of the migrant forms, more coming perhaps from the north than from the south. Geological evidence points to the fact that at times the roadway has not been a continuous route; there have been breaks in the land mass, leaving one or possibly even a chain of islands in its stead.

Animals arriving in Central America, encountering new environmental stimuli, often changed until no longer may the taxonomist recognize in them the characters of their immediate ancestors living or dead, but he must consider them as new local creations whose ancestry may only be conjectured. Thus many of the individual species now recognized in the fauna have developed *in situ,* descendants of older residents or migrants.

Moreover the spread of forms from the north or the south has taken place at various times and the degree of variation in local populations may offer a chronometer for measuring the relative time of arrival.

That the migration or spreading of species still continues is suggested by the fact that only a single representative of the large northern genus *Thamnophis* has reached Costa Rica and to our knowledge, has as yet not reached Panamá. Moreover, many species have entered Panamá from the south that have not been encountered across the border in Costa Rica. In this series such genera as *Lygophis, Trypanurgos, Peropodum, Trachyboa* and *Atractus* may be cited. Certain of these, of course, may actually occur and will eventually be reported for Costa Rica.

The fauna contains a few elements that did not arrive by land. These are species that have braved ocean voyages, or not impossibly, were brought unintentionally by man. Two forms appear to have arrived via a water route. These are *Tretanorhinus nigroluteus nigroluteus* and *Pelamis platyurus.* Of these, the first may be a relatively recent coastal arrival and while as yet no specimen has been found along the coastal or inland waters of Costa Rica, since it occurs both north and south of the country, its presence there is to be regarded as unquestionable. The second is a marine species from South Asia and the Malay Archipelago and the fact that it shows so few fixed differences from Asiatic members of the species,

may suggest an arrival in historic times, from, say, the Philippines as a stow-away on Spanish galleons. We are aware that something of this sort has happened in the case of a land snake *Typhlops braminus*, and certain lizards *Peropus mutilatus* and *Hemidactylus frenatus* in Mexico. The question whether the species could spread from a point of landing, south along the Central and South American coasts and/or north along the Central American and Mexican coasts during post-Columbian times, I believe, can be answered in the affirmative. I see nothing inconsistent in such a happening. Moreover, while certain species of sea serpents have definite migrations, I cannot believe that a bottom-feeding snake could survive a slow journey under its own power across the Pacific Ocean.

The country of Costa Rica is not large; it has a north-south length of approximately two hundred and fifty miles, and a total estimated area of 19,238 square miles.

Prior to the present geological uplift, which has connected North America and South America by the Panamá land bridge, and presumably Costa Rica to Nicaragua by a similar connection, it is highly probable that Costa Rica and the adjoining high part of Panamá constituted an island separated by relatively narrow straits from the high land of Nicaragua and likewise from the high land of eastern Panamá. At the point where Costa Rica bounds Nicaragua, the land is less than 100 meters above sea level. However, beginning near the northwestern border, and extending diagonally in a southeasterly direction, is a mountain chain that for a hundred miles maintains an elevation above 1000 meters, save for a single short break. It is known variously as the Cordillera Volcanica, and the northern part at least is called Cordillera de Guanacaste. In this range is a series of mountain peaks, mostly volcanoes. The northernmost is Volcán Orosi (1499 m.). Then follow Volcán Rincón de la Vieja (1502 m.), Volcán Miravalles (1750 m.), Volcán Tenorio (1432 m.), and Volcán Canaste (Pelón) (1900 m.).

Near the southern end of this Cordillera, there is a break in the continuity with the southern mountains (Cordillera Talamanca), but it is contiguous on the east with a shorter, higher range having only a slightly diagonal trend, the main axis being nearly east-west in direction. This is called the Cordillera Central and maintains throughout its length an elevation above 1500 m. with a series of volcanic peaks from west to east as follows: Volcán Poás (2760 m.); Volcán Barba (2929 m.); Irazú (3452 m.); Turrialba (3421 m.), the two latter being connected by a high isthmus above 2150 m. in elevation.

Immediately to the south of these ranges is the central plateau region. Here are to be found two rivers, the Rió Grande, draining to the Pacific via the Gulf of Nicoya and Rió Reventazón, flowing eastward into the Caribbean Sea. The minimum elevation of the divide between these two rivers is 1566 m. and represents the elevation of the isthmus connecting the Irazú volcano with the great southern Cordillera de Talamanca. Here too, on either side of the central plateau are the chief cities, San José, Cartago, Alajuela, Heredia, and Turrialba.

The directional trend of the Cordillera de Talamanca is to the southeast, practically the same as that of the mountain chain in northern Costa Rica. It maintains an elevation of 2150 m. for 110 miles save for a single break where a pass having an elevation somewhat more than 1538 m. occurs. There is a series of peaks in this chain as follows (north to south): Cerro las Vueltas, 3087 m.; Cerro Guericí, 3540 m.; Cerro de la Muerte, 3670 m.; Cerro Chirripo Grande, 3837 m., Cerro Durika, 3296 m.; Cerro Cruz del Obispo, 3099 m.; Pico Blanco, 3565 m. and Cerro Pando, 3162 m.

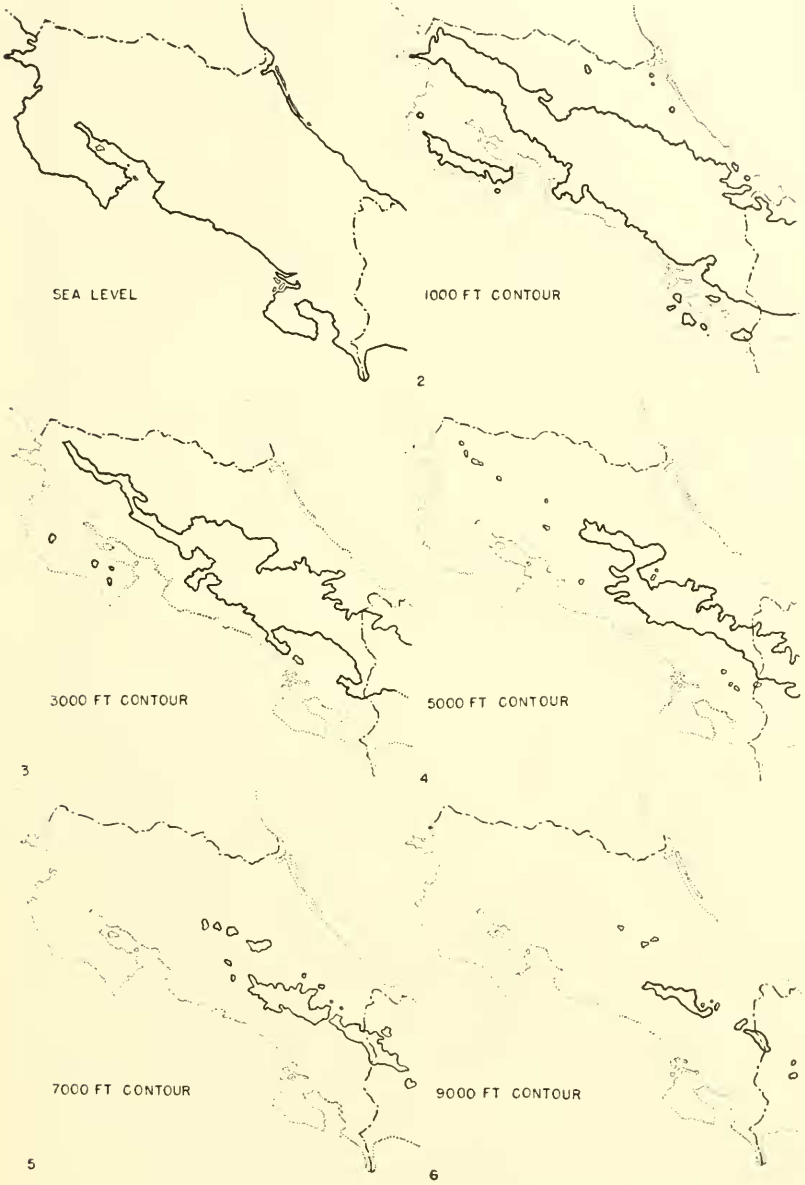
Northward a few peaks are isolated from the main range. Cerros de Escaso and Cerros de Bustamente are highest, with elevations 2425 m. and 2419 m. respectively. This mountain mass appears on certain maps as the Aguacate Mountains.

The peninsula of Nicoya jutting from the northwestern mainland has highlands connecting with the mainland by land, none of which reaches an elevation of 100 meters elevation and most of which is much lower; while in the mountainous portion elevations up to 1017 meters are recorded. At the southern extremity of the country on the Pacific side, the Peninsula de Osa as well as the mountain mass known as Pico de Burica present similar relations to the mainland. Elevations of 688 m. and 708 m. respectively are known. All three of these areas must have experienced island or archipelagic conditions in the past.

A study of Mexican faunae have shown marked differences in the components of the faunae of various high mountains. Mount Chiriquí, lying in northwestern Panamá, isolated from the main cordillera, seemingly has a fauna showing considerable differentiation from that of neighboring mountains. Such differences probably likewise obtain in certain of the isolated peaks of the Costa Rican mountains.

A series of outline maps have been made following the elevation contours at sea level, at 1000 feet, 3000 feet, 5000 feet, 7000 feet

and 9000 feet. These, better than any description, show the degree and extent of isolation of the mountain masses at the elevations given.



Outline maps of Costa Rica showing outline of the entire country; and the 1000, 3000, 5000, 7000, and 9000 foot contours (indicated by heavier lines).

The northern and southern areas are connected at elevation of 1566 m. (5000 ft.) but above this there is a break and animals adapted to elevations of 2000 m. and above are more or less effectively isolated. At still higher elevations there are several mountain "islands" separated from each other by varying distances. Whether it will eventually be shown that each of these higher peaks has endemic faunal elements is now only a matter of conjecture. Certain of them certainly have. The age of the various mountains (or volcanoes) will be a factor. One may presume the oldest ones, other things being equal, will display modifications in the greatest number of species. Unfortunately, fewer snakes become adapted to the higher elevations than either amphibians or lizards.

The extent to which one may divide the country into faunal zones and faunal areas purely on the study of the serpent fauna alone cannot be determined with any degree of certainty at the moment, since the distributional data are too meager and the collecting too haphazard. Many specimens in collections lack data as to locality, and if this is known, exact elevation data is often lacking.

The eastern, Caribbean, drainage area, and the Pacific drainage area together with the dry portions of the central plateau, constitute two areas differing considerably in amount of rainfall, and the concommitant differences in vegetation. The lowlands of the eastern area have an annual rainfall in excess of 200 inches a year. This is spread throughout the year with heavier fall in midwinter, December and January, and midsummer, June and July. As one approaches the summits of the cordilleras, the rainfall becomes less but even here the vegetation is lush. On the summits of the higher peaks the forest is absent but at least in the southern Cordillera the summits have much short bamboo that forms often practically impenetrable thickets. The ground itself is covered with moss and lichens, offering shelter for a very considerable salamander population.

The western Pacific slope is deprived of much of the moisture because of the excessive precipitation on the eastern slope caused by the high central mountains. Here the rainfall is confined very largely to the summer months, May to August, while the remainder of the year is dry, and months may pass with practically no rainfall. The dry season has much wind which results in further moisture loss.

Costa Rica is divided into a series of provinces in such a manner that a listing of the provincial faunas would contribute little to an understanding of distributional problems. Hence little effort has been made to associate place names with provinces.

FAUNA

The serpent fauna, for the size of the country and the present state of our knowledge, is large. This is due, in a measure, to the rugged and divergent characteristics of the topography, which allow for the interplay of a great variety of environmental stimuli on this plastic and definitely expanding group of reptiles. At the same time it has available necessary isolating barriers to select and fix the mutations that result. In this paper 132 species and subspecies are considered. These are arranged in 56 genera, under seven families.

The subfamilies of the Colubridae here treated are four; however the group Colubrinae is further divisible into other subfamily groups of perhaps equal rank with certain of those here treated. Certain of the species of snakes that have been listed heretofore for Costa Rica appear to be synonyms, and are so treated here; others so listed may be legitimate members of the fauna, but since I am unable to find verification of the record are not included. In this latter class are certain forms listed by Lic. Carlos Viquez S * as follows: *Anomalepis mexicana; Epicrates cenchria cenchria; Leimadophis taeniurus epinephalus; Atractus quadrivirgatus [= Adelphicos quadrivirgatus]; Urotheca lateristrigata [= Rhadinaea lateristrigata]; Urotheca elapoides elapoides [= Pliocercus elapoides elapoides]; Pseudoboa newiedii [= Clelia newiedii]; Micrurus elegans.*

The report of *Pseudoboa newiedii* Duméril, Bibron and Duméril *[= Clelia newiedii]* appears also in Amaral, Mem. Instit. Butantan, tome 4, p. 207 (81) and may be based on a legitimate report. However, I have not found record of any specimen taken in the country.

Synchalinus corralliodes Cope is regarded by Dunn as being a synonym of *Phrynonax poecilonotus.* I have not examined the type.

Ungaliophis continentalis F. Müller is reported by Amaral (Mem. Inst. Butantan, 1929, IV, p. 145 (19) "Guatemala occidental até Panamá). I have been unable to ascertain that the species has been taken south of Nicaragua.†

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* Nuestros Animales Venenosos, 1941, pp. 65-57.

† In the latest revision of the Boidae, Stull (Proc. Boston Soc. Nat. Hist., vol. 40, no. 8, pp. 387-408) revives the generic name *Peropodum* F. Müller for *Ungaliophis* dating the name from Müller, 1878, Verh. Nat. Ges. Basel, vol. 6, p. 652, pl. 1. It is true that on this page Müller did describe the genus *Peropodum*, and then proceeded to describe a snake without giving it a name, but the name appears elsewhere. In the listing of species on page 573, it appears "Boaedarum n. gen. et. sp. ?." The name Boaedarum is not intended as a generic name but is the genitive plural form of the family name. However, on page 591, one finds the following:

"Nov. gen. Boid. Affin. Ungal (Anm. 13)
"Spec. guatemalensis.
"a. Retalulén, costa grande v Guatemala, gesch. v. Dr. G. Bernoulli."

The (Anm. 13) refers to No. 13 of the Anmerkungen zum Katalog, which reads as follows:

ACKNOWLEDGEMENTS

I wish to offer my gratitude to the Kansas University Endowment Association, who generously provided a considerable portion of the funds for defraying my personal expenses in travel to and from Costa Rica, and travel and other expenses within the country.

I am deeply obligated to the President of the National University, Dr. Fernando Baudrit, for his generous invitation to become a guest of that Institution and spend the summer in Costa Rica in the study of the herpetological faunas.

My heartfelt thanks are offered to the genial, gifted, Prof. Rubén Torres Rojas, my official host in the country who joined me on certain memorable field expeditions; presented me with specimens, and "smoothed the way" for me on numerous occasions while I was entering and leaving the country.

I am under deep obligation to Dr. Ralph H. Allee, Director of the Inter-American Institute of Agricultural Sciences at Turrialba, who allowed me the privilege of making the Institute my headquarters, in furnishing transportation and for other very numerous courtesies. I am also under obligation to members of his staff: Dr. Frederick Wellman and Mrs. Wellman, Dr. Guillermo Bonilla, Dr. Cáceras, Dr. Rhoades, Mr. James Forman, and others who were untiring in their courtesy. A number of specimens collected by the Director's son, Mr. David Allee, were presented to the collection.

A number of other persons likewise merit my sincere thanks. A visit to the American Cinchona Plantation on Volcán Poás was arranged by Captain Hope, Production Manager of the plantation, who also provided transportation. Mr. Deal Thornton, the Station Director offered the facilities of the plantation and provided transportation.

Mr. Harshberger and Mr. Virgil Cave, officials of the Pan-American Highway, offered the facilities of the camps at Millville, near the summit of Cerro de la Muerte, and that at San Isidro El General. Mr. Cave presented the collection with several important specimens and provided much transportation.

To Mr. Wallace E. Manis, my genial and discerning host at Los Diamantes (U. S. Department of Agriculture Rubber Station), I offer my very cordial thanks.

"(13) Boïdae von Guatemala Peropodum, n. sp. et genus ? (Hiezu Tafel I). Costa Grande." Then follows a generic description and a species description of *guatemalensis*. Thus there can be no question that both genus and species are correctly established. The name has been attributed by Boulenger to Bocourt, Miss. Sc. Mex., Rept., p. 522, 1882. Accepting the synonymy of *Ungaliophis continentalis* F. Müller and *Peropodum guatemalensis* F. Müller, the latter name, not the former, must be used.

I am under obligation to several other persons, for specimens and courtesies, among whom may be mentioned are Prof. Marco Tullio Pacheco who collected with me and presented to me certain valuable specimens. Mr. Good and his sister, Miss Good, hosts at Finca Dominica at Turrialba, graciously permitted me to obtain a fine series of *Basiliscus plumifrons* from the shrubbery about the home. Señor Antonio Machado of the American Cinchona Plantation presented the collection with several fine specimens.

To Mr. Richard Taylor, I am grateful for his companionship and constant aid in the field, for the transportation by air of some forty pounds of my equipment, and finally for permission to study the collection which he made.

CHECKLIST OF THE SERPENTS OF COSTA RICA

The following list of genera, species, and subspecies are tentatively recognized in this paper. The genera number 56, the species and subspecies 132. (Figures in parentheses refer to page numbers in this volume.)

Family Anomalepidae (24)
- Genus Anomalepis Jan (24)
  - *dentatus* Taylor (24)
- Genus Liotyphlops Peters (25)
  - *albirostris* (Peters) (25)
- Genus Helminthophis Peters (26)
  - *frontalis* (Peters) (26)

Family Leptotyphlopidae (27)
- Genus Leptotyphlops Fitzinger (27)
  - *albifrons* (Wagler) (27)

Family Boidae (28)
- Genus Boa Linnaeus (28)
  - *annulata* (Cope) (28)
- Genus Constrictor Laurenti (29)
  - *constrictor imperator* (Daudin) (29)
- Genus Epicrates Wagler (30)
  - *cenchria maurus* Gray (30)

Family Colubridae (30)
- Subfamily Acrochordinae (30)
  - Genus Nothopsis Cope (30)
    - *torresi sp. nov.* (31)
- Subfamily Sibynophinae (35)
  - Genus Scaphiodontophis Taylor and Smith (35)
    - *venustissimus* (Günther) (35)
- Subfamily Natricinae (36)
  - Genus Thamnophis Fitzinger (36)
    - *sirtalis chalceus* (Cope) (36)
- Subfamily Colubrinae (composite) (37)

Genus Geophis Wagler (38)
[*rhodogaster* (Cope)] (39)
godmani Boulenger (40)
hoffmanni (Peters) (40)
dolichocephala (Cope) (43)
moesta Günther (44)
brachycephala (Cope) (46)
Genus Ninia Baird and Girard (49)
sebae sebae Duméril, Bibron and Duméril (50)
atrata (Hallowell) (50)
maculata (Peters) (51)
tessellata Cope (53)
psephota (Cope) (55)
oxynota (Werner) (55)
Genus Dipsas Laurenti (58)
anthracops (Cope) (59)
pictiventris (Cope) (59)
argus (Cope) (60)
articulata (Cope) (61)
annulata (Günther) (61)
ruthveni (Barbour and Dunn) (62)
costaricensis sp. nov. (62)
Genus Sibon Fitzinger (67)
nebulatus (Linnaeus) (67)
Genus Neoparias Günther (66)
bicolor Günther (66)
Genus Tretanorhinus Duméril, Bibron and Duméril (66)
nigroluteus nigroluteus Cope (67)
Genus Xenodon Boie (68)
bertholdi Jan (69)
colubrinus Günther (69)
Genus Enulius Cope (70)
flavitorques (Cope) (70)
sclateri (Boulenger) (71)
Genus Helicops Wagler (74)
wettsteini Amaral (74)
Genus Hydromorphus Peters (74)
concolor Peters (74)
Genus Trimetopon Cope (75)
pliolepis Cope (76)
viquezi Dunn (78)
simile Dunn (79)
gracile (Günther) (79)
Genus Hypsiglena Cope (80)
torquata torquata (Günther) (80)
Genus Amastridium (80)
veliferum Cope (81)
Genus Spilotes Wagler (82)
pullatus pullatus (Linnaeus) (82)
pullatus mexicanus (Laurenti) (83)

Genus Thalerophis Oliver (84)
mexicanus mexicanus Duméril, Bibron and Duméril (84)
depressirostris (Cope) (85)
nebulosus (Oliver) (85)
richardi occidentalis (Günther) (86)
Genus Dryadophis Stuart (87)
melanolomus alternatus (Bocourt) (87)
Genus Drymobius Fitzinger (88)
margaritiferus margaritiferus (Schlegel) (89)
rhombifer (Günther) (89)
chloroticus (Cope) (90)
melanotropis (Cope) (91)
Genus Dendrophidion Fitzinger (91)
paucicarinatus (Cope) (91)
dendrophis (Schlegel) (92)
Genus Pseustes Fitzinger (92)
poecilonotus chrysobronchus (Cope) (92)
shropshirei Barbour and Amaral
Genus Chironius Fitzinger (95)
carinatus (Linnaeus) (95)
grandisquamis (Peters) (96)
melas (Cope) (97)
Genus Elaphe Fitzinger (97)
triaspis (Cope) (98)
flavirufa flavirufa (Cope) (98)
Genus Drymachron Fitzinger (99)
corais melanurus Duméril, Bibron and Duméril (99)
Genus Masticophis Baird and Girard (100)
mentovarius Duméril, Bibron and Duméril (100)
Genus Leptodrymus Amaral (101)
pulcherrimus (Cope) (101)
Genus Leimadophis Fitzinger (102)
taeniurus juvenilis Dunn (102)
Genus Lampropeltis (103)
doliata micropholis Cope (104)
doliata polyzona Cope (103)
doliata gaigae Dune (104)
Genus Pliocercus Cope (106)
dimidiatus Cope (106)
annellatus sp. nov. (107)
Genus Liophis Wagler (110)
cobella Linnaeus (110)
Genus Rhadinaea Cope (111)
serperastra Cope (112)
calligaster (Cope) (113)
decorata decorata Günther (113)
pulveriventris Boulenger (116)
vermiculaticeps (Cope) (116)
persimilis Dunn (117)
pachyura pachyura (Cope) (117)
pachyura decipiens (Günther) (118)

Grooved back-fang series [Boiginae] (118)
Genus Trimorphodon Cope (120)
biscutatus biscutatus Duméril, Bibron and Duméril (120)
Genus Leptodeira Fitzinger (121)
nigrofasciata Günther (121)
rubricata (Cope) 122)
annulata annulata (Linnaeus) (122)
ocellata Günther (125)
rhombifera Günther (126)
maculata (Hallowell) (126)
Genus Oxybelis Wagler (127)
fulgidus (Daudin) (127)
brevirostris (Cope) (128)
aeneus (Wagler) (128)
Genus Imantodes Duméril and Bibron (130)
inornatus Boulenger (130)
cenchoa semifasciatus Cope (132)
gemmistratus Cope (135)
Genus Clelia Fitzinger (135)
clelia clelia Daudin (135)
petolarius (Linnaeus) (138)
Genus Erythrolamprus Boie (140)
bizonus Jan (140)
Genus Coniophanes Hallowell (141)
decipiens (Günther) (141)
piceivittis Cope (142)
fissidens punctigularis Cope (142)
Genus Rhinobothryum Wagler (144)
bovalii Andersson (144)
Genus Conophis Peters (145)
lineatus dunni Smith (145)
nevermanni Dunn (145)
Genus Stenorrhina Duméril (146)
degenhardtii degenhardtii (Berthold) (146)
degenhardtii apiata Cope (147)
freminvillii freminvillii Duméril, Bibron and Duméril (147)
Genus Scolecophis Fitzinger (148)
atrocinctus (Schlegel) (148)
Genus Tantilla Baird and Girard (149)
annulata Boettger (149)
armillata Cope (152)
reticulata Cope (153)
virgata (Günther) (154)
shistosa (Bocourt) (155)
ruficeps (Cope) (156)
Family Hydrophiidae (156)
Genus Pelamis Daudin (156)
platurus (Linnaeus) (156)

Family Elapidae (157)
Genus Micrurus Wagler (157)
mipartitus multifasciata (Jan) (158)
nigrocinctus nigrocinctus (Girard) (160)
nigrocinctus mosquitensis Schmidt (164)
pachecoi sp. nov. (165)
clarki Schmidt (168)
alleni richardi subsp. nov. (169)
Family Viperidae (172)
Genus Bothrops Wagler (composite) (172)
atrox atrox (Linaeus) (179)
nummifer (Rüppell) (181)
picadoi Dunn (180)
nasuta Bocourt (177)
ophryomegas Bocourt (178)
lansbergii (Schlegel) (178)
nigroviridis nigroviridis (Peters) (176)
lateralis (Peters) (175)
godmani (Günther) (183)
schlegelii (Berthold) (173)
Genus Crotalus Linnaeus (183)
terrificus durissus Linnaeus (183)
Genus Lachesis Daudin (184)
muta stenophrys Cope (184)

KEY TO FAMILIES OF COSTA RICAN SNAKES

1. Scales on midventral line of belly not, or scarcely, wider than adjoining scales.... 2
   Scales on belly several times wider than adjoining scales..... 5
2. Tail short strongly compressed vertically, forming an oar; marine snakes; eye well developed .....Hydrophiidae
   Tail very short, round; eye covered with head shields, concealed or faintly visible. 3
3. Teeth in lower jaw only; ocular scale reaching lip; scales in 14 rows around the body .....Leptotyphlopidae
   Teeth in upper jaw or in both jaws..... 4
4. Teeth in upper jaw only; ocular separated from lip by labial scale; hyobranchium Y-shaped .....Typhlopidae*
   Teeth in one or both jaws; ocular separated from lips by two scales; hyobranchium W-shaped .....Anomalepidae
5. A deep pit between nostril and eye.....Viperidae
   No pit between nostril and eye..... 6
6. Anterior part of maxillary provided with a stationary grooved fang.....Elapidae
   Anterior part of maxillary without a grooved fang; however the posterior tooth in maxilla may be grooved..... 7
7. Vestiges of hind limbs; ventral scales relatively narrow, distinctly less than width of body .....Boidae
   No vestiges of hind limbs; ventral scales as wide as or wider than body, normally .....Colubridae

* Typhlopidae is included in the key, although no specimen of the family has been reported in Costa Rica. It occurs to the north, in Guatemala and south in Colombia.

FAMILY ANOMALEPIDAE

The recent findings of Tihen published under the name Dunn and Tihen,* and of Tihen† strongly suggest the wisdom of recognizing these small snakes under the family name proposed by Taylor.‡

Three genera, *Anomalepis*, *Helminthophis* and *Liotyphlops*, are regarded as belonging in this family.§ The three genera may be differentiated by the following key.

KEY TO COSTA RICAN ANOMALEPIDAE

1. Rostral less than half width of head; preoculars two 2
   Rostral at least half width of head; no preocular scales ..... *Liotyphlops*
   One subocular ..... *Helminthophis*
   Two suboculars ..... *Anomalepis*

Genus ANOMALEPIS Jan

Anomalepis Jan¶ in Jan and Sordelli, L'iconographie Générale des Ophidiens, livr. 1 (?Dec. 1860), p. 1, pl. 5, fig. 1; Arch. per la Zool., vol. 1, p. 185, 1861.

Genotype: *Anomalepis mexicanus* Jan.

Anomalepis dentatus Taylor

Anomalepis dentatus Taylor, Proc. New England Zool. Club, vol. 17, 1939, pp. 90-91 (type locality, Barro Colorado Island, Canal Zone**).

A small species of this genus reported from Costa Rica is referred to *dentatus*. The species may be recognized by the following characters: Very small snakes, known maximum size, 158 mm.; teeth in both jaws; rostral visible from above for a distance equal to its distance from frontal, its greatest width a little less than half

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* Dunn and Tihen, Journ. Morph., vol. 74, no. 2, 1944, pp. 287-294, pl. 1.

† Tihen, Copeia, 1945, no. 4, Dec. 31, pp. 204-210.

‡ Taylor, Proc. New England Zool. Club, vol. 17, 1939, pp. 87-96, pl. 5.

§ See Smith and Warner, Herpetologica, vol. 4, pt. 6, Dec. 8, 1948, pp. 189, 193.

¶ Not "Jan and Sordelli" as Dunn insists, Bull. Mus. Comp. Zool. Harvard Coll., vol. 87, No. 7, 1941, p. 511. According to Jan (Elenco sistematico degli Ofidi descritti e disegnati per L'iconografie générale, 1863, p. 9) the name *Anomalepis* dates from the cited publication; while the specific name is attributed to the Iconographie Générale des Ophidiens, livr. 1, dated December 1860 but presumably issued at a somewhat later date than that stated.

** In the original description, credit for the discovery of this form was attributed to James Zetek, since the label in the container and the invoice sent with the specimen contained Mr. Zetek's name. Dr. Emmet Reid Dunn has made a claim that he is the collector of the specimen that served as the type. Thinking Dr. Dunn's claim preposterous, I wrote to Mr. Loveridge of Harvard University from whom the specimen was borrowed. Mr. Loveridge admits an error in cataloguing the specimen. Dr. Dunn is the collector.

In a paper by Dunn (Bull. Mus. Comp. Zool. Harvard College, 87, 1941) attempting to correct some typographical errors in my original paper, and to excuse certain of his own previously published errors, he is guilty of further errors and questionable taste.

1. Dunn states that the authority for the name *Anomalepis mexicanus* is Jan and Sordelli. I have attributed the name to Jan, and this is correct despite Dunn's statement. Jan was solely responsible for the taxonomy. Sordelli was the illustrator. Jan makes this clear by associating his name alone with the species.

2. Dunn likewise makes this mistake on pages 511, 512, and likewise erroneously attributes the name *Leptognathus vagus* to the two authors.

3. On page 516 Dunn refers to a species of *Anomalepis* as *maxicanus*. No such species has been described.

Other errors in Dunn's paper will be taken up when occasion demands.

the width of head; prefrontals large, longer than wide, about as long as frontal; frontal broader than long, four times as large as the supraocular scales. Five scales border frontal, two laterally, the anterior of which is the supraocular; behind frontal is the postfrontal; following the postfrontal are two rather large median scales followed by two somewhat smaller median scales. The one touching the postfrontal is largest and bordered laterally by a quadrangular scale separated from the ocular by a somewhat smaller postocular.

Nasal divided, the lower anterior portion small; the nostril lying diagonally between the two parts; anterior supralabial large, widely separating nasals from mouth, its labial border narrower than labial borders of other supralabials; second supralabial small but larger than fourth and smaller than third which nearly equals first; loreal bounded by three labials in front and below, by the larger nasal and two preoculars above; two subequal suboculars and two postoculars, the upper much the larger; eye dimly visible; three infralabials; mental grooved but apparently not divided; when mouth is closed, six scales appear to border upper labials. A pair of preanal scales in contact anteriorly. Scale formula 28-24-22-22-24 (23 or 22). Dorsal scales from rostral to terminal caudal plate, 272. Scales under tail, 7-9. Total length (maximum known), 158 mm.; tail, 3 mm.

Genus LIOTYPHLOPS Peters

Liotyphlops Peters, Sitzb. Ges. naturf. Fr., 1881, p. 69.

Genotype: *Liotyphlops albirostris* Peters.

Whether more than a single species of *Liotyphlops* occurs in Costa Rica is difficult to say. If there is but one, there may be some doubt as to the proper name to apply to it. *Typhlops (Idiotyphlops) emunctus* Garman, *Rhinotyphlops albirostris* Peters and *Helminthophis canellei* Mocquard have been described from Panamá. *Helminthophis bondensis* Griffin, described from Bonda, Colombia, has been reported in Panamá also. The postulation that these species are based on anomalous specimens and are synonyms of *albirostris* needs confirmation.

Knowledge of the presence of the genus in Costa Rica is based on the report of a Costa Rican specimen of *Liotyphlops albirostris* in "Frankfort 7005a" (presumably Germany). There is a specimen of *Helminthophis eumunctus* in the U. S. National Museum said to be from Costa Rica, collected by J. A. McNeil. McNeil collected the type (M. C. Z. No. 3971) in Panamá. Perhaps the "Costa Rica" locality is an error.

Liotyphlops albirostris (Peters)

Rhinotyphlops albirostris Peters, Monatsb. Akad. Wiss. Berlin, 1857, p. 402 (type locality, Veragua).

Liotyphlops albirostris Peters, Sitz. Gesell. Naturf. Freunde, 1881, p. 69; Bocourt, Etudes sur les Reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 8, 1882, pp. 501-502, pl. 30, fig. 1, 1a-1c (figure of type); Dunn, Proc. Biol. Soc. Washington, vol. 45, Oct. 1932, pp. 174-175 (Costa Rica).

Head narrowed and flattened somewhat; rostral well developed, narrowed at level of nostrils, half (or slightly more than half) width of head extending back beyond level of eyes, in contact with the frontal, which is at least twice as broad as long; two large prefrontals extending to posterior level of rostral but not in contact behind rostral; no preocular; two suboculars; eye distinguishable under the suture between the prefrontal and the small ocular; four upper labials, first largest touching rostral, second in contact narrowly with the prefrontal; the second and third supralabials separated from ocular by a subocular; scales in a row from mouth to anus approximately 392-414; 11-13 under tail; 22 scale rows around body.

Blackish or dark brown, each scale with a reddish brown border.

I regard *Liotyphlops eumunctus* (Garman) as a species distinct from *L. albirostris*. The scales of the type are approximately 425 mouth to anus, and 12 subcaudals. There are no enlarged anals. The scales following the frontal are three, the median transversely elongate.

Genus HELMINTHOPHIS Peters

Helminthophis Peters, Monatsb. Akad. Wiss. Berlin, 1860, p. 517; Tihen, Copeia, 1945, no. 4, Dec. 31, pp. 204-210; Smith and Warner, Herpetologica, vol. 4, pt. 6, Dec. 8, 1948, pp. 189-193.

Genotype: *Helminthophis frontalis*.

Helminthophis frontalis (Peters)

Typhlops (*Helminthophis*) *frontalis* Peters, Monatsb. Akad. Wiss. Berlin, 1860, p. 517, pl., fig. 1, a-c (type locality, Costa Rica).

Helminthophis frontalis Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 8, 1882, pp. 502-503, pl. 30, figs. 2, 2a-b; Boulenger, Catalogue of the Snakes of the British Mus., 2nd ed., vol. 1, pp. 5-6, 1893; Amaral, Proc. New England Zool. Club, vol. 9, 1924, p. 25; Mem. Inst. Butantan, Tomo 4, 1929, p. 136; Dunn, Proc. Biol. Soc. Washington, vol. 45, 1932, pp. 173-175 (San José, Costa Rica).

This diminutive, cylindrical, wormlike snake, without widened ventral scales, may be recognized by the following characteristics: dark brown above, a little lighter below; the head, neck and anal region white; rostral large and broad, somewhat less than half width of head, not extending back to the level of eyes, separated from frontal by the prefrontals, which form a common suture; fron-

tal broad; two preoculars and one subocular; eye distinguishable under the small ocular; four upper labials; ocular in contact with third supralabial or narrowly separated by the subocular; ocular scale separated from frontal by supraocular; upper preocular touches the second supralabial, lower preocular touches the second and third supralabials. Diameter of body about 58 times in total length; longitudinal scale rows 22; 23 transverse scale rows on tail. Total length, 158 mm.

I have examined a single Costa Rican specimen, M. C. Z. 34879. This specimen has the head and anterior part of the neck whitish cream without trace of pigment. The scale formula is 20-22-22. The scales from mouth to anus are approximately 476. Two large preoculars, the lower largely covering eye; ocular does not touch labial; upper preocular also separated from labials; lower preocular touches two labials.

FAMILY LEPTOTYPHLOPIDAE

A single genus of this family of diminutive snakes is known to occur in Costa Rica.

Genus LEPTOTYPHLOPS Fitzinger

Leptotyphlops Fitzinger, Systema Reptilium, 1843, p. 24.

Genotype: *Leptotyphlops nigricans.*

One species, *Leptotyphlops albifrons*, occurs in Costa Rica. It is a widespread form that, as now understood, extends throughout much of Central America and over a considerable area in northern South America.

Leptotyphlops albifrons (Wagler)

Stenostoma albifrons Wagler, *in* Spix, Serp. Brasil sp. nov., 1824, p. 68, pl. xxv, fig. 3; Duméril and Bibron, Erpétologie Générale. . . . , 1844, vol. 6, p. 327.

Leptotyphlops (= *Glauconia*) *albifrons* Wettstein, Sitz. Akad. Wiss. Wien Math.-Naturw. Klasse, Abt. 1, Bd. 143, Heft 1-2, 1934, p. 31 (Guanacaste: Bebedero).

This tiny, wormlike snake may be readily recognized by the brown coloration, somewhat lighter on venter than on back, each scale with darker edges, the color tending to form indistinct lines; a cream-white spot on top of head; lips and end of tail white.

Snout rounded; supraocular present, large, in contact or not with first labial; rostral scarcely reaching back to level of eyes, which are distinguishable under the ocular scale; nasal completely divided; ocular bordering lips between two labials; six infralabials; 14 scale rows around the body, lacking distinguishable ventrals;

body diameter 45 to 55 times in head-body length; tail in total length 15-21 times. Total length, 275 mm.

In Costa Rica the species is known from Bebedero, in the low area in Guanacaste. I have not examined any Costa Rican specimens.

FAMILY BOIDAE

Three genera of this family are known to occur, each represented by a single known species. These may be identified by the following synopsis.

KEY TO COSTA RICAN SPECIES OF BOIDAE

1. Small snakes, probably less than one meter in length; ventrals 260; subcaudals 82; scale rows about middle of body, 54; nasals separated by a pair of small internasals; usually two or three enlarged loreals with the same number of smaller scales below them; 12 scales between eyes. Ash colored with darker oval figures on either side ..... *Boa annulata*
   Large snakes from two to four meters in length 2
2. 61-79 scale rows around body; ventrals 225-252; subcaudals 47-65; 15-18 scales between eyes. Pale brown with numerous dark brown crossbars or blotches each usually with a pair of cream-colored dashlike marks; a dark line in middle of head and neck ..... *Constrictor constrictor imperator*
   Scales 45-51 about body; ventrals 233-238; subcaudals 55-58; 2 enlarged supraoculars separated by 4-6 scales; usually an enlarged loreal, with one or two smaller below it; a pair of normal internasals and a pair of normal prefrontals. Nearly uniform brown in color, the spots obsolescent or absent.... *Epicrates cenchria maurus*

Genus BOA Linnaeus

Boa Linnaeus (*part*), Systema Naturae, vol. 1, 1766, p. 373; Wagler, Natürliches System der Amphibien, 1830, p. 169.

Genotype: *Boa canina* Linnaeus.

One species occurs in Costa Rica.

Boa annulata (Cope)

Xiphisoma annulatum Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1875, p. 129, pl. 28, fig. 6 (type locality, Costa Rica); Bocourt. Etudes sur les reptiles; Mission scientifique au Mexique et dans l'Amérique Centrale, livr. 8, 1882, pp. 526-527, and livr. 9, 1883, pl. 31, fig. 4, 4a.

Corallus annulatus Boulenger, Catalogue of the Snakes in the British Museum, vol. 1, 1893, p. 102.

This small boa may be recognized by the following characters: Body strongly compressed, nearly three times as high as wide; scales in 42 rows on anterior part of neck, 54 near middle of body; top of snout covered with small scales, of which two, a little larger than the rest, separate the nasals and border the rostral. Top of head covered with small smooth scales, twelve to fourteen rows between eyes; no enlarged supraoculars; supralabials 15-15, the eighth to twelfth strongly pitted on the sutures; 18-19 infralabials, the ninth

to seventeenth pitted; six scales in loreal region; four supraoculars; four postoculars; two suboculars; one or two preoculars; one series of scales separates the orbit from the labials and bounds the labial pits. Ventrals 260; anal single; subcaudals, 82.

A Harvard M. C. Z. specimen (No. 37862 from Costa Rica [no specific locality]) has the head, in front of eyes, covered by some 40 small scales; eye bordered by 12 scales, the preocular largest; nasal divided; six scales occupy the loreal region; rostral higher than wide; chin shields small, scarcely distinguished from adjoining chin scales, the first pair touching only two labials. The second row of scales, back from eye border, is somewhat enlarged. Anteriorly the pattern consists of some H-shaped median dark spots between which are elongate oval fawn lines; the sides of H's tend to separate forming paired lateral spots having light centers and dark edges which may be opposite each other or alternate, or again may be joined mesially. The pattern tends to darken and become indefinite in old specimens.

The species has been recorded in Costa Rica from Ontario Farm and La Castilla on the lower Reventazón River, and Limón. The type specimen has been examined. It is from the Caribbean slope in the southeastern part of the country.

Genus CONSTRICTOR Laurenti

Constrictor Laurenti, Specimen medicum exhibens Synopsin Reptilium emendatum, 1768, p. 107.

Genotype: *Constrictor formosissimus.*

A single representative of this genus of boas occurs in Costa Rica. It is the largest snake known in the fauna.

Constrictor constrictor imperator (Daudin)

Boa imperator Daudin, Histoire Naturelle . . . reptiles, vol. 5, 1803, pp. 150-152 (type locality, Mexico).

Constrictor constrictor imperator Ihering, Rev. Mus. Paulista, vol. 8, 1910, p. 321.

One large specimen, M. N. H. No. 25754, was taken on the I. A. I. A. farm about three kilometers southwest of Turrialba and presented to me by the several workmen who captured the specimen. It measures a little less than 6 feet in length. The scale formula is 60-70-65-37; ventrals 243, subcaudals 67 (several near vent divided); anal single but greatly narrowed as are the three ventrals preceding anals; spots on body, 21½; on tail 4½ with extreme tip black; supralabials 23-22; infralabials 24-25; 17 scale rows between eyes.

This snake is common in the lowland areas in Costa Rica, and reaches elevations up to 3000 feet and perhaps somewhat higher.

Genus EPICRATES Wagler

Epicrates Wagler, Natürliches System der Amphibien, 1830, p. 168.

Genotype: *Epicrates cenchris* Wagler.

Epicrates cenchria maurus Gray

Epicrates maurus Gray, Catalogue of the Specimens of Snakes in the collection of the British Museum, 1849, p. 96 (type locality, Venezuela).

Epicrates cenchria maurus Stull, Proc. Boston Soc. Nat. Hist., vol. 40, no. 8, 1935, p. 396.

Epicrates cupreus var. *concolor* Bocourt. Etude sur les reptiles; Mission Scientifique au Mexique. . . . Livr. 8, 1882, pp. 525-526, pl. 31, fig. 3, 3a (part). (Costa Rica.)

Generally similar to *Epicrates cenchria cenchria.* Snout covered with regular scales but frontal and parietal areas covered with small irregular scales; the elongate loreal touching first labial but separated or not separated from second and third by small scales; supraoculars usually present but may be broken into more than a single scale; two preoculars, four or five postoculars; shallow pits present in upper and lower labials. Scales in 45-48 rows around body; ventrals 233-238 subcaudals 55-58, single; length (of a Costa Rican specimen) 1300; tail 157.

Uniform brownish, the dorsal spots almost, or entirely, obsolete.

FAMILY COLUBRIDAE

Four subfamilies are being recognized. These are the Natricinae, Sibynophiinae, Acrochordinae, and Colubrinae. It is probable that the Colubrinae as here considered is divisible into several subfamily groups. However, owing to the inadequate knowledge of the anatomy of several genera, I am not recognizing certain of such groups that have been proposed (*i. e.*, Xenodontinae, Dipsadinae, Boiginae, Dromicinae, Leptognathinae, Erythrolamprinae, Scytalinae, etc.).

The Natricinae, Sibynophiinae and Acrochordinae are represented each by a single genus, while no less than 28 genera are included in the Colubrinae as here considered.

SUBFAMILY ACROCHORDINAE

This small subfamily has one or two Asiatic genera and a single genus, *Nothopsis*, in the Western Hemisphere.

Genus NOTHOPSIS Cope

Nothopis Cope, Proc. Acad. Nat. Sci. Philadelphia, Oct. 24, 1871, p. 201.

Genotype: *Nothopsis rugosus* Cope.

Two species have been described in the genus. These are *Nothopsis rugosus* Cope from Darien and *N. affinis* Boulenger from

Salidero, N. W. Ecuador. A third form is here described as *torresi* from Turrialba, Costa Rica. The range of the genus is from Costa Rica to Ecuador.

Nothopsis torresi sp. nov.

Plate I

Type.—University of Kansas Museum of Natural History No. 28719; taken at the Morehead Finca, 5 miles southwest of Turrialba, Costa Rica, July 16, 1947, by Edward H. Taylor.

Diagnosis.—A small snake, heavily keeled, the scales in 26 or 25 rows about middle of body; outer edges of smooth ventrals turned up and finely striated, as are the lateral scales; body strongly compressed; nasal very large, single, with an entrant suture; two internasals; prefrontal area covered with 20-25 small granular scales; supraoculars large or divided, separated from single frontal by a row of small scales; large parietals present with a lateral entrant suture tending to separate the posterior parts from the main scale; eight rows of temporals; five postoculars, labials separated from the eye by two rows of small scales; four or five preoculars, one enlarged; ventrals 149; subcaudals 71; eighteen maxillary teeth.

Description of type.—Rostral nearly triangular, somewhat concave, directed upward and forward, barely visible from above; a pair of enlarged internasals, narrowed anteriorly, touching rostral, a little longer than wide, in contact for three fourths of their length; a small pair of scales following internasals somewhat larger than granular scales that separate them; remainder of area, usually occupied by prefrontals in most snakes, broken up into numerous (approximately 20) keeled scales, two of which are rounded and symmetrical, separated from each other and frontal; supraocular small, posterior part wider than anterior, separated from frontal and parietals by a single row of scales; frontal about as wide as long, its edges irregular, with a short suture entering from the front; parietals each nearly as large as frontal, their edges irregular; a pair of "postparietal" scales following, partly fused to parietals.

Nasal large, smooth with a depressed area, in which nostril is pierced; a suture from lower part of scale partly divides it; a flaplike valve? present in nostril; area between nasal and eye occupied by a number of smooth scales, one somewhat enlarged touches two labials and nasal, and another enlarged one enters border of eye as a preocular; four other granular preoculars and five postoculars present; one or two rows of suboculars separate the labials from the

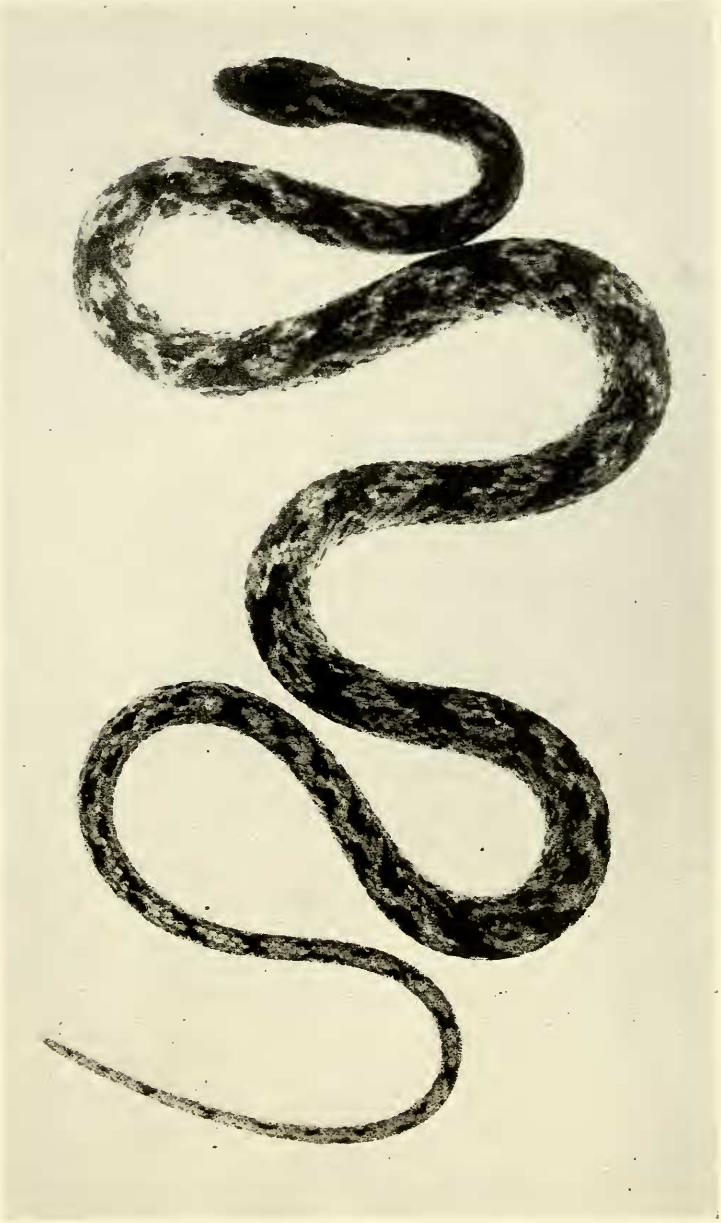

PLATE I. *Nothopsis torresi sp. nov.* Type. MNH No. 28719, Morehead Finca, 5 miles southwest of Turrialba, Costa Rica; total length, 401 mm.

orbit; temporal region with eight rows of small keeled scales between labial and parietals; 9-10 supralabials, smooth save for the upper edges of the posterior scales which are striate. Mental triangular, narrower than rostral; first infralabials in contact behind mental; 12-13 infralabials, but posterior scales partly fused together (two on right side, four on left); a single pair of chinshields; about ten small scales separate chinshields from first ventral.

Scales heavily keeled on body, less so on head; scale rows around back of head, 39; narrow part of neck, 26 (25); 26 (25) about middle of body; 22 in front of anus; five or six median scale rows larger than lateral scales; ventrals 149; anal single; subcaudals 71, divided, except first; terminal spine of tail directed somewhat down at tip and partly scaled dorsally.

Eye small, about 2 1/5 times in its distance from nostril.

Color.—Head black; labials fawn; chin cream; dorsal ground color lavender-brown, growing lighter low on sides; a series of about thirty-two saddlelike, rather irregular, dark blotches which widen laterally and are in contact with each other on anterior half of body; posteriorly they may be together or they may fail to touch dorsally; a series of somewhat more discrete dark spots are immediately below the saddles; numerous scattered dots on fawn-colored ventrals; pattern continued on tail, but much reduced; scales bordering ventrals on sides of neck nearly white; beginning in the occipital region are two very short cream lines, which are separated by a median black area five or six scales in width.

Measurements in mm.—Head length, 13; greatest width of head, 7; width at eyes, 5; total length, 401; tail, 117; body, 284.

Teeth.—Eighteen (17) maxillary teeth all bent back strongly, increasing a little in size from fore to aft, then followed after a short diastema by two larger, heavier teeth.

Relationships.—Two species of the genus are known—*Nothopsis rugosus* (type) and *Nothopsis affinis*. The present form may be distinguished by the presence of an even or odd number of scale rows; the reduction of the scales about the middle of body and the increase in the number of maxillary teeth, approximately 18 instead of 12.

When Boulenger described his *Nothopsis affinis*,* he had before him a specimen of *Nothopsis* from Carriblanca, Costa Rica, which he identified as *Nothopsis rugosa* Cope, a species whose type locality is "Isthmus of Darien." *N. affinis* is reported as having 27 scale rows

* Ann. Mag. Nat. Hist., (ser. 7) vol. 15, 1905, p. 453.

and the type of *rugosa* has 29. The species here described has a pair of median scale rows which at intervals are fused on the median line in series of two to five scales. Consequently, the count is 26 scales where the median scales are not fused, 25 where they are fused.

Whether Boulenger's Carriblancan specimen is actually a member of the species here described cannot at this time be determined.

Remarks.—Part of the scales on the head are smooth and shining (rostral, nasals, internasals, scales in loreal region for the most part, and labials). It is possible, but I think not probable, that this is due to wear. The other scales have heavy keels and the scale surface is very finely roughened by what appear to be extremely numerous fine keels or striations.

I collected the specimen at night quite by accident, when I grabbed at a small anole in a pile of leaves on the ground, near the edge of a swampy area in the forest. The specimen made no attempt to bite.

The following table presents in tabular form the differences in the three species.

COMPARATIVE DATA ON SPECIES OF NOTHOPSIS

	Ventrals	Subcaudals	Scale row	Supralabials	Maxillary teeth	Total length	Tail
rugosa.....	158-161	97-100	28-30	12	12	381	?
affinis.....	162	98	27	10	?	320	100
torresi.....	149-153	71-92	(25-26)	9-10	18	401	117

The species is dedicated to Sr. Prof. Rubén Torres Rojas, noted educator and scientist of Costa Rica, and my official host in the country.

I have examined a female specimen from the Reventazón Valley (M. C. Z. Harvard No. 15269) which I have referred with a question to *Nothopsis torresi.* It differs from the type in that there is no tendency of the two median dorsal scale rows to fuse, the formula being 26-26-22. Some of the characters of this specimen are: 25 small scales on the top of rostrum, those following internasals somewhat larger and regular; the supraoculars are broken into two or three scales, separated from the frontal by a row of small scales; the frontal has a groove causing it to appear paired; parietals large, separated mesially by small granular scales; supralabials 10-10; infralabials 11-13; ventrals 153; anal single; subcaudals 92.

I have compared the new form with a specimen of *N. rugosa* Cope from Panamá. This specimen has the scale formula 30-28(29)-26; ventrals 161; subcaudals 97.

SUBFAMILY SIBYNOPHIINAE

A single generic representative of this subfamily, *Scaphiodontophis*, is known in the Western Hemisphere.

Genus SCAPHIODONTOPHIS Taylor and Smith

Scaphiodontophis Taylor and Smith, Univ. Kansas Sci. Bull., vol. 29, pt. 2, 1943, pp. 302-304, fig. 1.

Genotype: *Enicognathus annulatus* Duméril, Bibron and Duméril.

Only a single species of this genus has been reported from Costa Rica. The range of the genus extends from northern Veracruz in Mexico to Colombia.

Scaphiodontophis venustissimus (Günther)

Hemicognathus venustissimus (Günther, Biologia Centrali-Americana, Reptilia and Batrachia, Oct. 1894, p. 144, pl. 51, fig. C (type locality, Matagalpa Hda. Rosa de Jerico [3250 ft.], Nicaragua).

Sibynophis venustissimus Dunn, Occ. Papers Boston Soc. Nat. Hist., vol. 5, 1930, p. 330 (incorrectly attributes the spelling of this name by Günther as *venistussimus;* perhaps a *lapsus mentum*) (Zent, Costa Rica).

Scaphiodontophis venustissimus Taylor and Smith, Univ. Kansas Sci. Bull., vol. 29, pt. 2, 1943, pp. 309-311, fig. 5.

The species may be distinguished by the following diagnosis: frontal as long as its distance to rostral or a little longer; loreal rhombic; one preocular; two postoculars, both touching parietal; temporals 2 + 2 or 1 + 2; supralabials nine, the fourth, fifth and sixth entering orbit; chinshields of both pairs about same length, the anterior the larger; scales in 17-17-17 rows, smooth; ventrals 137-152; anal divided; subcaudals 96+; maxillary teeth small, 43-56 in a continuous series.

Coral (or reddish olive) above, with 8-11 white-edged, transverse, black bands, which terminate at the ventrals, these often broken and alternating; top of head generally whitish from rostral to anterior part of parietals with an indistinct smoky spot on snout; this followed by a yellow transverse band to near posterior end of parietals, and this in turn followed by a black band, and a white band across neck five scale rows back of parietals. Upper labials, chin and venter whitish but with some pigmentation forming indistinct spots on the edges of ventrals; each subcaudal with a large black spot. Red scales with black tips.

I have examined the following Costa Rican specimens: M. C. Z. No. 15308, Bonilla, Costa Rica; M. C. Z. No. 15272, Zent, Costa Rica; and U. S. N. M. No. 67350 from Columbaria, Costa Rica.

In the latter specimen the snout is blackish or blackish brown but the interorbital region is somewhat lighter. This is followed by a large black spot occupying the posterior three fourths of the parietals and the first six or seven scale rows on neck. The body has red bands separated by eight white-black-white triads (four of which are broken mesially, the halves alternating). Ventrals 152; the tail is injured, the tip missing.

SUBFAMILY NATRICINAE

Only one genus, *Thamnophis,* reaches Costa Rica.

Genus THAMNOPHIS Fitzinger

Thamnophis Fitzinger, Systema Reptilium, 1843, p. 26.

Genotype: *Coluber sauritus* Linnaeus.

Thamnophis sirtalis chalceus* (Cope)

Prymnomiodon chalceus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860 (1861), p. 558 (type locality "Siam" in error).
Thamnophis sauritus chalceus Dunn, Herpetologica, vol. 1, 1940, pp. 192-193.

The genus *Thamnophis* has numerous species and subspecies in the United States, and the number of forms becomes even larger in Mexico. The Isthmus of Tehuantepec limits the greater number of these, and the range of only one is known to reach southward as far as Costa Rica.

The single specimen at hand, M. N. H. No. 25679, is one collected by Sr. Rubén Torres Rojas and Sr. Marco Tullio Pacheco about two miles south of Cartago. This specimen, which the collectors presented to me, has the following characteristics:

Rostral once and one-third times as wide as high; internasals as long as the prefrontals; latter nearly one third wider than long; frontal more than one fourth wider than long, the length more than one fifth greater than its distance from tip of snout; length of parietal one sixth longer than the frontal, equal to its distance from the internasals; nasal divided, touching two supralabials; loreal about as long as high or a little longer; preoculars, 1-1, two to three times as high as wide, rather narrowly separated from the frontal; postoculars 2-3 (on one side the two lower scales are almost completely fused); temporals $1 + 2 + 1$ $(1 + 2 + 2)$; supralabials 8-8, the fourth and fifth bordering eye; infralabials 10-10, five bordering first chinshields; second pair of chinshields longer than first pair, separated by small scales.

* Klauber has suggested that *sirtalis* as a species name applies to this species. Copeia, No. 1, 1948, pp. 8-10.

Scales finely corrugated or striate, each bearing a strong keel, and a small terminal notch. The scale formula is 19-17-17; ventrals 156, subcaudals 88; anal single. In life the specimen was olive, with a dim median line, and a very dim line on the third and fourth scale rows.

The specimen was taken near a shallow pond on which water hyacinths were floating.

I have also examined U. S. N. M. No. 38149 from San José, Costa Rica. The following scale characters were recorded: scale formula 19-19-19-17, all rows keeled; ventrals 151; subcaudals 84; one preocular touching frontal on one side, not on other; two-three postoculars; loreal present; nasal divided; a small entrant suture in the frontal; temporals 1 + 2 + 2; 8-8 supralabials, the fourth and fifth entering orbit; 10-10 infralabials, five touching the first pair of chinshields, which are shorter than second pair and separated by a small scale.

A median dark-edged light line present on back begins between parietals; two small spots present on parietals.

SUBFAMILY COLUBRINAE

Twenty-nine genera are treated under this subfamily.

KEY TO THE GENERA OF THE COLUBRINAE

1. Nasal scales in contact behind rostral (rarely very narrowly separated); nostril directed upward 2
   Nasal scales not in contact behind rostral, the nostril directed outward laterally... 3
2. Internasals fused into a single scale behind nasals.....*Helicops*
   Internasals not fused into a single scale.....*Tretanorhinus*
3. Prefrontals fused into a single scale..... 4
   Prefrontals not fused into a single scale..... 5
4. Nostrils in a single nasal scale directed upward; large snakes (900 mm.); coloration uniform .....*Hydromorphus*
   Nostrils in at least semidivided nasals, directed laterally; small snakes, less than 300 mm.; (part of genus only).....*Trimetopon*
5. Lacking a median mental groove, the chinshields transversely arranged; a loreal and preocular both entering orbit; four postoculars.....*Neoparias*
   A median mental groove present; the chinshields longitudinally placed..... 6
6. The maxillary teeth nearly equal without posterior enlarged fangs, or the size reducing posteriorly 7
   Maxillary teeth increasing in size, the last one or two somewhat fanglike not grooved and may or may not be separated from the series by an interval..... 14
7. Anal plate single..... 8
   Anal plate double.....*Elaphe*
8. No preocular; loreal and prefrontal bordering orbit of eye..... 9
   A preocular, the loreal and prefrontal separated from orbit..... 12
9. No anterior temporal.....*Geophis*
   Anterior temporal present..... 10
10. Scales 17-21 rows, strongly keeled.....*Ninia*
    Scales 15-13 rows, smooth..... 11
11. Teeth diminishing in size posteriorly.....*Sibon*
    Teeth not diminishing in size posteriorly.....*Dipsas*

12. Scales smooth; scale formula 19, 19(21)-17 ..... *Drymarchon*
Scales keeled 13
13. Four median scale rows keeled; scale rows uneven; scale formula 21-25-15... *Pseustes*
Dorsal scales, save outer row, keeled; scale rows in even numbers 14(16)-16-10 ..... *Spilotes*
14. Posterior fanglike teeth separated from other maxillary teeth by a toothless interval 15
Posterior enlarged teeth of maxillary series not separated by a toothless interval from the remainder of the maxillary teeth 17
15. Body slender, the tail 30-39% of total length; small snakes; four or five maxillary teeth followed by fang ..... *Enulius*
Tail less than 25% of total length 16
16. Scales arranged in oblique transverse rows; large thick-bodied snakes, length one meter or more) ..... *Xenodon*
Scales not arranged in oblique rows; smaller snakes, 800 mm ..... *Leimadophis*
17. No loreal present, tail one third total length; scales 17 rows, faintly keeled posteriorly ..... *Amastridium**
Loreal present 18
18. Scales about body in even numbers ..... *Chironius*
Scales about body in odd numbers 19
19. No apical pits present 20
Apical pits present 21
20. Body banded black and red or black, yellow and red (the red and yellow fading in preservative to cream or white ..... *Pliocercus*
Body not banded; pattern, if present, of dark and light stripes or lines .... *Rhadinaea*
21. Eye with elliptic pupil ..... *Hypsiglena*
Eye with round pupil 22
22. Diminutive snakes probably not exceeding 250 mm. in length; scales in 15 rows (part of genus only) ..... *Trimetopon*
Medium to large snakes, all reaching 700 mm. or more in length 23
23. Body black crossed by whitish lines; belly yellow or coral red with transverse black spots (*cobella*) ..... *Liophis*
Not so marked 24
24. Body banded in red, black and yellow or these bands tending to become obscured (darker) ..... *Lampropeltis*
Not so marked 25
25. Four black longitudinal stripes; rostral projecting, part visible above about half distance to frontal ..... *Salvadora*
Not so marked 26
26. Scales smooth 27
Scales keeled 28
27. Scales in 17-17-15 rows; 9 supralabials ..... *Dryadophis*
Scales in 17-15-13 rows; 7 or 8 supralabials ..... *Masticophis*
28. Scales in 17 rows around body 29
Scales in 15 rows reducing to 11 in front of anus ..... *Thalerophis*
29. Maxillary teeth generally more than 33 ..... *Dendrophidion*
Maxillary teeth generally less than 33 ..... *Drymobius*

Genus GEOPHIS Wagler

Geophis Wagler, Natürliches System der Amphibien, 1838, p. 194.

Genotype: *Catostoma chalybeum* Wagler.

Six species are recognized as occurring in Costa Rica.

KEY TO COSTA RICAN SPECIES OF GEOPHIS

1. Scales smooth in 17 rows, no supraocular; ventrals 135-141; subcaudals 30-43 *rhodogaster*
Scales in 15 rows, smooth or partly keeled; supraocular present or absent 2

* (*Mimetopon sapperi* Werner, sometimes placed in the genus *Amastridium* is reputed to have a minute groove visible at a magnification of 80 diameters.

2. Scales smooth; no supraocular; ventrals 144-145; subcaudals 27-28. Blackish brown above, yellowish or whitish below; a few transverse blotches under tail occasionally present on posterior part of belly.....*godmani*
Scales at least partially keeled; a small supraocular present..... 3
3. Scales keeled at base of tail; supralabials five (rarely six); ventrals 129-133, subcaudals 31-36; black above, below brownish yellow or whitish; a light nuchal band in young.....*hoffmanni*
Scales keeled and striate on at least one third or more of body and tail; color variable; supralabials six..... 4
4. Large red spots alternating or opposite on sides of body; ventrals 131-138; subcaudals 39-46; scales striated and strongly keeled on posterior half of body; head narrow elongate .....*dolichocephala*
No large red spots on sides of body; scales striate and keeled on greater part of body 5
5. Infralabials 7; ventrals 131-140; subcaudals 32-39; blackish with a dim nuchal collar; venter whitish with some pigment extending onto ventrals (rarely nearly across) .....*moesta*
Infralabials 6 (7); ventrals 143-144; subcaudals 34-35. Black with a narrow lateral orange stripe; venter smoky black, each scale with a lighter edge..*brachycephala*

[*Geophis rhodogaster* (Cope)]

Calophrys rhodogaster Cope, Proc. Acad. Nat. Sci. Philadelphia, Mar. 1868, p. 130, fig. ("Neighborhood of the city of Guatemala").

Geophis rhodogaster Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 9, 1883, p. 531, pl. 31, fig. 12, a-e; Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, p. 317.

Eye small, measuring two thirds to three fourth its distance from mouth; snout rounded, feebly projecting; rostral moderate, slightly broader than deep, the part visible from above about one third its distance from the frontal; internasals nearly twice as broad as long, one half to two fifths of the length of the prefrontal; prefrontals broader than long; frontal broader than long, as long or a little longer than its distance from the end of snout; a little shorter than parietals; no supraocular; frontal bordering eye; loreal nearly twice as long as deep; one postocular; six supralabials, third and fourth bordering eye; three infralabials border first chinshields, which equal or are longer than the posterior, separated from mental; scales in 17 rows, perfectly smooth; ventrals 135-144; anal single; subcaudals 30-43.

Uniform dark brown above; upper lip, outer row of scales and lower parts uniform orange.

The species is reported from Costa Rica by Boulenger, *loc. cit.* Günther (Biologia Centrali-Americana; Reptilia and Batrachia, 1893, pp. 87-88) mentions a specimen in Smithsonian Institution as a basis for a Costa Rican record. Boulenger, *op cit.*, also gives Costa Rica as within the range of *rhodogaster*, perhaps on the basis of Günther's statement. I regard the record as somewhat doubtful.

Geophis godmani Boulenger

Geophis godmani Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, p. 322, pl. 16, fig. 4 (type locality, Irazú, Costa Rica); Dunn, Notulae Naturae, no. 108, 1942, p. 4.

Eye small, a little shorter than its distance from the mouth; snout obtusely pointed, very prominent; rostral rather large, a little higher than broad, the portion visible above measuring two thirds to three fourth its distance from frontal; internasals a little broader than long, half as long as the prefrontals, which are a little longer than broad; frontal as long as broad, as long as or a little shorter than its distance from end of snout, shorter than parietals; no supraocular; prefrontal forming a narrow suture with the parietal between frontal and eye; loreal once and a half times as long as broad, entering orbit; a minute postocular; six supralabials, the third and fourth entering orbit; three infralabials touching chinshields which are not longer than posterior and are separated from mental; scales in 15 rows, all perfectly smooth; ventrals 144-145; anal single; subcaudals 27-28. Uniform blackish brown above, yellowish beneath; a few transverse brown blotches under tail, sometimes also on belly. Total length, 400 mm.; tail, 55 mm.

Known in Costa Rica from the type locality, Volcán Irazú; from Escazú, and Tierra Blanca.

Geophis hoffmanni (Peters)

Plate II, figs. 1-2

Colobognathus Hoffmanni Peters, Monatsb. Akad. Wiss. Berlin, 1859, p. 276, pl., fig. 2-2c (type locality, Costa Rica).

Geophis hoffmanni Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 9, 1883, pl. 31, figs. 8, 8a-c; Dunn, Notulae Naturae, no. 108, 1942, p. 4 (mentions 40 Costa Rican specimens, from 11 localities; also specimens from Boquete, Panamá).

Four specimens of *Geophis hoffmanii* were collected: Two on the Pacific drainage near San Isidro El General, and two in the Central Plateau: one at Turrialba and one at Cartago.

Description from No. 1032.—Portion of rostral visible above, a

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PLATE II

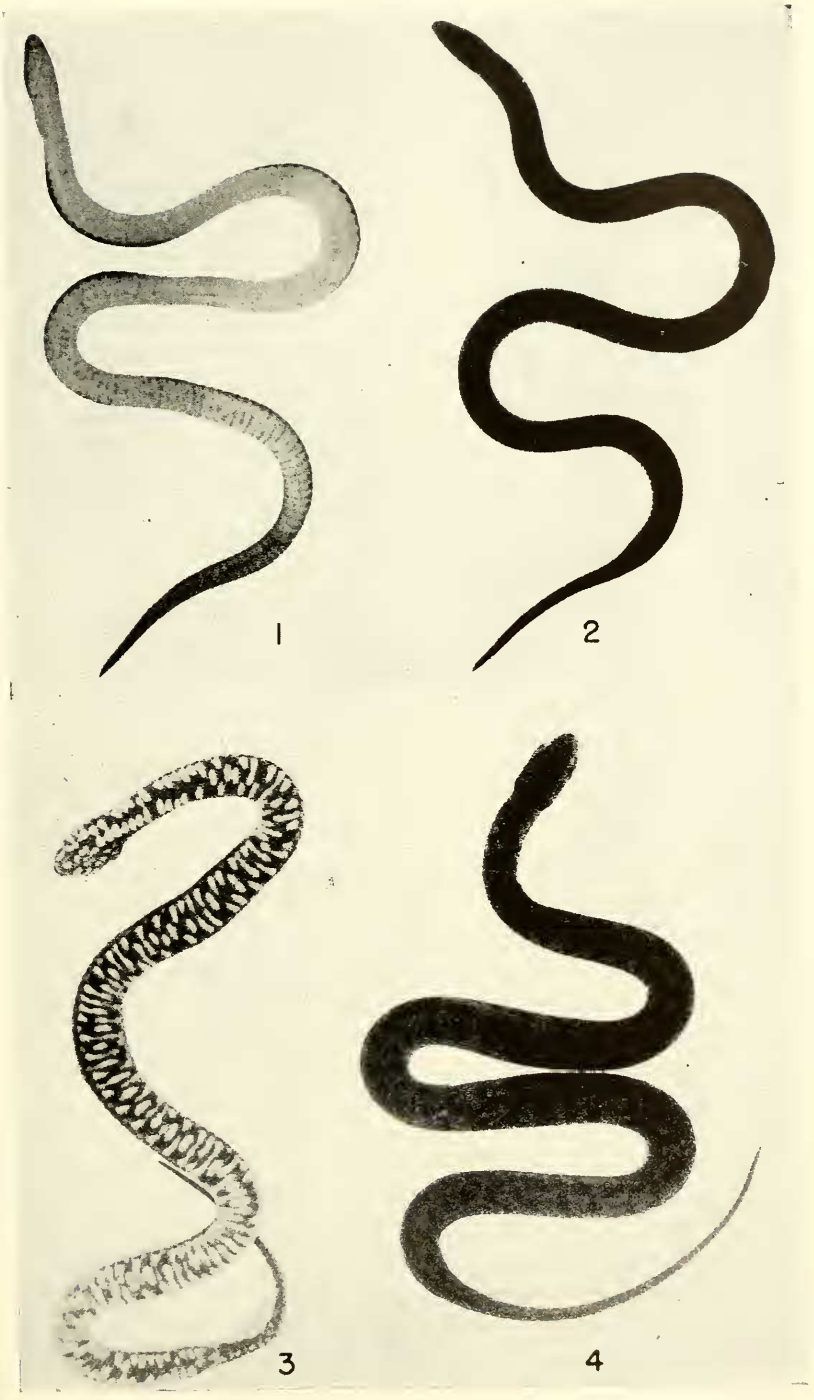
FIG. 1. *Geophis hoffmanni* (Peters), RCT No. 346, Turrialba, Costa Rica, July 13, 1945; total length, 201 mm. Ventral view.

FIG. 2. *Geophis hoffmanni* (Peters), MNH No. 1032, San Isidro El General, August 22, 1947; total length, 192 mm. Ventral view.

FIG. 3. *Ninia tessellata* (Peters), RCT No. 1445, Los Diamantes, Costa Rica, September 1-8, 1947; total length, 233 mm. Ventral view.

FIG. 4. *Ninia tessellata* (Peters), RCT No. 1364, Los Diamantes, Costa Rica, September 1-8, 1947; total length, 279 mm.

PLATE II



little larger than an internasal; nostril between two subequal nasal scales; internasals small, about one fifth as long as the prefrontals, and about one sixth their area; frontal six-sided, its width minutely greater than its length, its length about one-seventh longer than its distance from tip of snout; length of parietal equal to its distance from the rostral; loreal elongate nearly twice as long as high entering orbit; supraocular small, scarcely larger than postocular; no preocular, one postocular; no anterior temporals, the fifth (and last) labial broadly bordering the parietal; five supralabials, the third and fourth border eye; six infralabials, the first three border the first chinshields; these equally as long as second pair; second chinshields partly separated by a large scale.

Scale formula, 15-15-15; all smooth except at the base of the tail, at which point the scales are small (15 scale rows) and keeled (in both sexes); ventrals, 133 (2 small scales between ventrals and chinshields); subcaudals, 31; anal single.

Total length, 192 mm.; tail, 29 mm.; width of head, 3.5 mm.; length of head to end of parietals, 6 mm.

The color in life is generally bluish black, more or less iridescent on dorsal and lateral surface of body and head; no neck band; ventrals flesh white, the white extending onto the outer scale row, for the most part covering less than half the scale row; a peppering of smoky black pigment on the ventrals usually extending across the outer third on each side; darker under the tail but some light color on each subcaudal.

The other specimens differ but little in color from the one described. One specimen has the ventrals without pigment for nearly two thirds the length of the body. In another, smoky pigment encroaches on the white part of the first scale row. The squamation of the specimens is very uniform. All have the scales smooth save at the base of the tail where there are 15 keeled scale rows reduced in size. The scale formula is the same in all. The relation of the two pairs of chinshields is the same, and a median scale tends to separate the posterior part of the second pair, both pairs being tubercular in males. Five is the constant number of supralabials, the last very large, broadly bordering the parietal. There are no primary temporals lying between the parietals and labials. One secondary temporal borders the parietal behind the fifth labial in all.

It would appear that these specimens, one from the Caribbean drainage (Turrialba No. 346) and two from the Pacific drainage (San Isidro El General No. 880, No. 1032) and one from the central plateau region (Cartago No. 1020), represent a species that shows

very little variation despite the diverse geographical areas it occupies. I have examined several Harvard specimens as follows:

A Harvard M. C. Z. specimen, No. 15304, from Navarro, Costa Rica has four supralabials, the third and fourth being fused; infralabials five; ventrals 134, subcaudals 29; lateral scales keeled at the base of the tail.

No. 15267 ♂, has five supralabials and six infralabials; a small supraocular present, not in contact with the small postocular; ventrals 126; tail broken; keels present at base of tail.

No. 15271 ♀, from La Palma, Costa Rica has the ventrals with brownish pigment tending to cross the ventrals; ventrals 133; subcaudals 28; keels near tail base scarcely indicated.

Nos. 19327 ♂ and 19328 ♀ from Suretka, Costa Rica, have respectively 124 ventrals, 37 subcaudals; 134 ventrals, 30 subcaudals. In the former specimen the loreal narrowly enters orbit; in the latter, it is excluded from orbit. Both specimens have five supralabials and six infralabials.

Two specimens in the U. S. National Museum are from Cartago and San José, Costa Rica.

Geophis dolichocephala (Cope)

Plate III, fig. 2

Colobognathus dolichocephalus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1871 (Oct. 24), p. 211 (type locality, San José, Costa Rica).

Catostoma dolichocephalus Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1875, p. 147.

Elapoidis dolichocephalus Cope, U. S. Nat. Mus. Bull. no. 32, 1887, p. 85 (San José).

Geophis dolichocephalus Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, pp. 320-321 (Cartago, Costa Rica).

Geophis brachycephalus (*part.*) Dunn, Notulae Naturae, no. 108, 1942, p. 5.

A specimen of this species (No. 25732) was taken in a pile of chips at the edge of a tiny rivulet on the Morehead finca, five miles southwest of Turrialba, Costa Rica.

Color brownish black above with a series of 21 brick-red blotches on each side. Anteriorly blotches scarcely distinguishable and separate; on the latter two thirds of the body they are confluent mesially or separated by a very narrow dark line. On sides the spots, which are rarely more than three scales long, reach to first scale row. A small red spot present near angle of jaw. Belly flesh white with some olive reflections; head blue-black with metallic reflections. The lower labials and chinshields black, and tail black without red spots. Caudals black with indefinite lighter areas on each scale. The dark color of sides extends onto ventrals a greater or lesser distance. Most scales of outer row have a narrow diagonal cream spot, which in the aggregate suggests a zigzag line.

The scale characters of this species follow: rostral visible above broader than high; internasals small, subtriangular, about one fourth the total length of the prefrontals, about one third of the median suture between prefrontals; frontal very broad, only minutely longer than broad, almost quadrangular; supraocular diminutive, as wide as long or minutely longer; parietals elongate, (4.8 x 3.3 mm.), shorter than their distance from snout tip; nasal divided, the nostril pierced chiefly in anterior part; an elongate loreal entering eye and replacing the missing preocular; a small postocular; no anterior temporal; one posterior temporal; 6 supralabials, the third and fourth entering the orbit; 7-7 lower labials, four touch first pair of chinshields; second pair of chinshields smaller than first; eyes small, contained in distance from snout tip about three and one-third times. Scales smooth or very finely striate on neck; striate and keeled over remainder of dorsal surface except outer enlarged scale row; scale formula, 15-15-15; ventrals 142; anal single, subcaudals 48. Total length, 359 mm.; total ventrals and subcaudals 190; snout to vent, 283 mm.; tail, 76 mm.; head length, 11.6 mm; head width, 6 mm.

The type of this form is described as having only 13 scale rows but Boulenger (*loc. cit.* footnote) states that Cope has checked the type and finds 15 scale rows present. The type has 131 ventrals, 39 subcaudals; total ventrals and subcaudals 170, which is 20 less than this specimen. Boulenger lists two specimens having ventrals 135, 138 and subcaudals ? and 46.

Geophis moesta Günther

Geophis moestus Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1872, p. 15 (type locality, Cartago, Costa Rica); and Biologia Centrali-Americana, Reptilia and Batrachia, May 1893, pp. 90-91, pl. 33, fig. C.

Geophis hoffmanni Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, pp. 319-320 (all or part).

Geophis brachycephalus part. Dunn, Notulae Naturae, no. 108, 1942, p. 4.

Dunn, *op. cit.*, has recently placed this form in the synonymy of *Geophis brachycephalus.* This I regard as an error since the species appear to be distinct.

The following are the characteristics of M. N. H. No. 25738 taken ½ mi. NE of Santa Cruz, south slope of Volcán Turrialba: scales 15-15-15; supralabials 6; infralabials 7-7; scales keeled throughout

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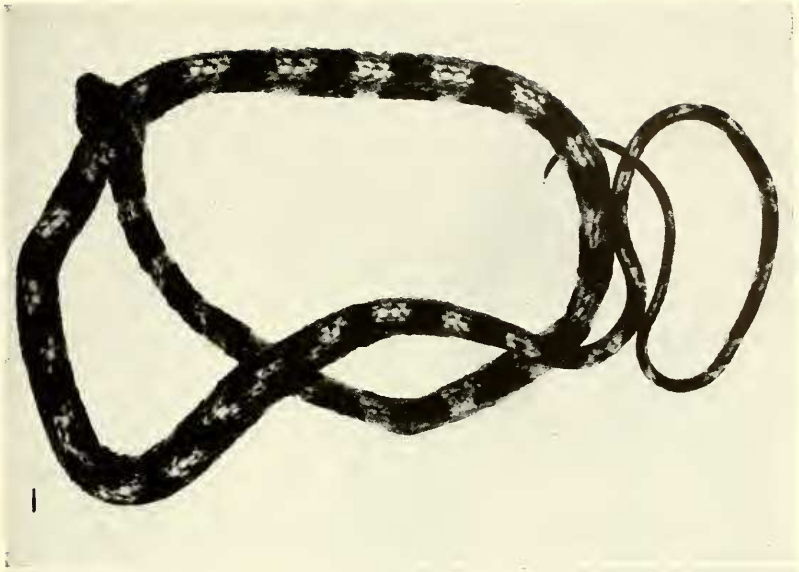
PLATE III

FIG. 1. *Dipsas annulata* (Günther), M.N.H. No. 25702, Isla Bonita, Costa Rica, August 5, 1947; total length, 501 mm.

FIG. 2. *Geophis dolichocephala* (Cope). M.N.H. No. 25732. Morehead Finca, 5 miles SW Turrialba, Costa Rica, July 14, 1947; total length, 359 mm.

PLATE III



1

2

latter three fourths of body; anterior chinshields larger and longer than posterior (or nearly of same size), which are partially or entirely separated by a median scale in one specimen. Ventrals, 131; subcaudals, 39; anal single. A black spot on anterior chinshields; supraocular present, twice as large as the single postocular; a light band across back part of head and anterior part of neck (tending to disappear in old adults); posterior nasal much larger than anterior; fifth labial touches parietal; one secondary temporal; three or four infralabials touch first chinshields.

A second female specimen (R.C.T. No. 839), from about one-half mile east of Santa Cruz, has 140 ventrals and 32 subcaudals. In this the infralabials are 7-6; the posterior chinshields are not separated and are only a little smaller than the first pair.

Both specimens are blackish with a dim nuchal collar, the venter being whitish with some dark pigment on outer edges of ventrals. Posteriorly in one specimen (No. 25738) the dark color extends almost across the ventrals; the subcaudals likewise blackish, each scale with a narrow transverse light line across the middle. There is a brownish area on the top of head. When submerged in water, No. 839 shows the outer borders of body scales slightly darker than their median parts. The infralabials are white in both specimens and some lighter color may be evident on the anterior scales of the outer row.

Geophis brachycephala (Cope)

Plate IV, figs. 2-3, text fig. 1

Colobognathus brachycephalus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 211 (type locality, Costa Rica).

Catostoma brachycephalum Cope, Journ. Acad. Nat. Sci. Philadelphia, 2d ser., vol. 8, 1875 and 1876, p. 147.

Dirosema brachycephalum Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, p. 299.

*Geophis brachycephalus** (*part.*) Dunn, Notulae Naturae, no. 108, 1942, p. 4.

Two specimens of this rare snake were found under small logs on the side of Volcán Turrialba at an elevation of near 6000 feet, about three kilometers above the village of Santa Cruz. The general coloration is blue black with an orange-red lateral stripe (not of solid color) two or three scales wide anteriorly but posteriorly about one scale wide; venter dusky, each ventral scale lighter edged.

These specimens were coiled tightly, almost into a ball under the same logs as were found a number of leeches equally as large, or larger, black in color with red markings low on sides and in ventral

* Dunn includes *dolichocephalum*, *mocsta*, *quadrangularis* and *championi* as synonyms of this species.

regions. These were likewise coiled into a ball-like mass and occupying small excavations or depressions below the logs as were the snakes. In each case where a snake was found, one or more leeches was present. On superficial examination they are very similar to the snakes. Under some logs only the leeches were found, invariable rolled into a knotted ball-like mass. I found no evidence that the leeches preyed on the snakes. Since they are larger or equally as large as the snakes, I think it unlikely that the snakes use the leeches for food. However when placed in a sack, a leech fastened on one of the snakes. I regard this as a matter of chance.

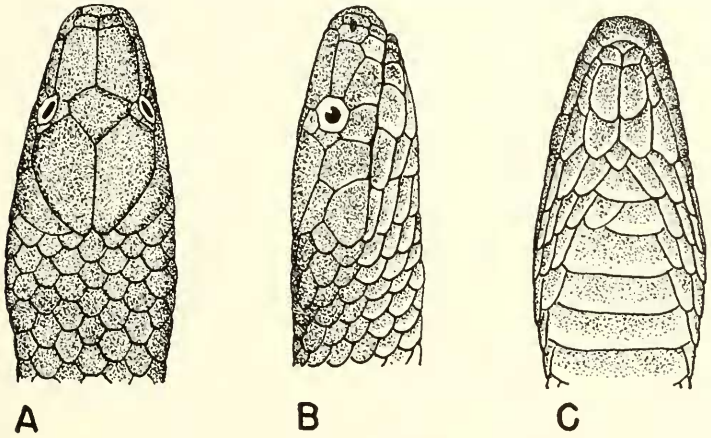


FIG. 1. *Geophis brachycephala* M.N.H. No. 25735. Collected 3 miles NE Santa Cruz, on the southern slope of Volcán Turrialba. A, Head, dorsal view; B, Head, lateral view; C, Head, ventral view. ×4.

The scale characters of the two specimens (R. C. T. No. 840 and M. N. H. No. 25735 respectively) are given: Scale formulae, both, 15-15-15; ventrals, 144, 143; subcaudals, 34, 35; anal, 1; no preoculars; postocular, 1-1; supraocular, 1-1; supralabials, 6-6; supralabials enter eye, 3, 4; infralabials, 6-6; touch chinshields, 3-3; total length and tail length, 245-35; 230-24.

Area of frontal visible above smaller than or nearly as large as an internasal; latter scales less than one third the length of the prefrontals; latter very large, about five times area of internasals; frontal hexagonal, about 1/6 wider than long, its length greater than its distance from tip of snout; parietals as long as their distance from the tip of the snout; nasal divided; no anterior temporal, the fifth labial bordering the parietal; one posterior temporal; loreal

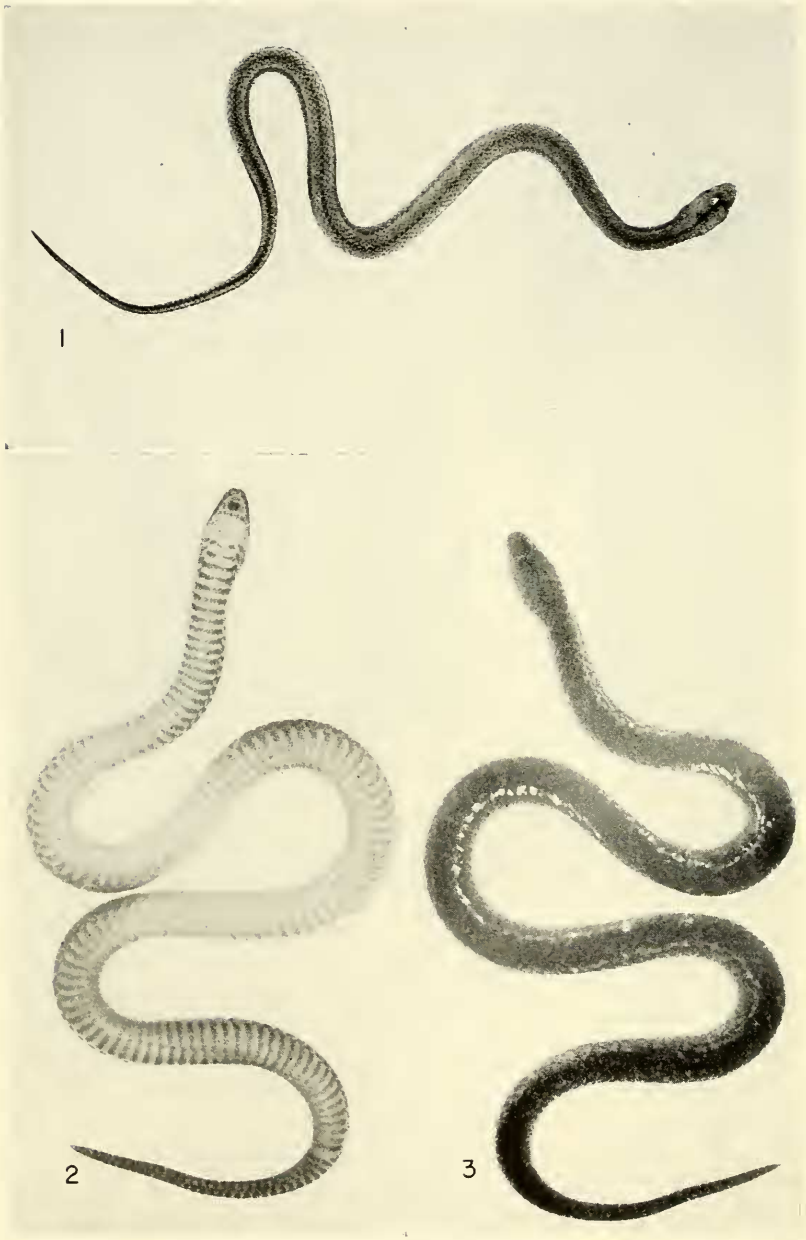


Plate IV. Fig. 1. *Coniophanes fissidens punctigularis* Cope, Los Diamantes, 1 mile south Guápiles, Costa Rica, September 2, 1947; about natural size. RCT No. 1369.

Fig. 2. *Geophis brachycephala* (Cope), RCT No. 840, Volcán Turrialba, Costa Rica; elevation, approximately 6000 feet; total length, 245 mm. Ventral view.

Fig. 3. *Geophis brachycephala*. Same as fig. 2 dorsal view (retouched).

two, to two and one-half times, as long as high; first chinshields about as long as but larger than second pair (in one specimen distinctly longer); scales smooth anteriorly, keeled and finely striated on posterior half of body and tail.

Black above, with a salmon to orange-red lateral stripe made up of flecks, extending from neck to tail, but growing more faint posteriorly. The stripe covers much of the second and third rows but posteriorly it is on the third and fourth. Occasionally scales of the scale row above the stripe are colored likewise, suggesting a series of spots connected by the stripe. Venter smoky black with a whitish line across each ventral not strongly contrasted; each subcaudal smoky black with a lighter area; a blackish spot on anterior chinshields.

On No. 840 the lateral stripe is less distinct than in No. 25735. The type is said to have a yellowish collar, a character that may be confined to younger specimens.

Two specimens of the species examined at Harvard (M. C. Z. Nos. 15321 and 28070) have respectively 142 ventrals, 43 subcaudals; 141 ventrals and 34 subcaudals; supralabials 6, 6; infralabials 6, 7; the scales keeled and striate on body; there is an irregular orange stripe on sides of body in both.

Genus NINIA Baird and Girard

Ninia Baird and Girard, Catalogue of North American Reptiles in the Museum of Smithsonian Institution, Pt. 1, Serpents, 1853, p. 49.

The small ground snakes of the genus *Ninia* are numerous in Costa Rica, six forms being recognized. All the members of the genus are small and slender, rarely reaching half a meter in length.

SYNOPSIS OF COSTA RICAN FORMS OF NINIA

1. Scales in 17 rows 2
   Scales in 19-21 rows 3
2. Dorsal coloration uniform black; venter black, part of the ventrals with red marks; 6 supralabials; a sharp median keel, the body triangular in cross section; ventrals 162; subcaudals 73 ..... *psephota*
   Dorsal coloration varied, consisting of numerous blackish or brownish bands narrowing on sides, separted by narrow whitish, or brownish-white zigzag lines usually considerably less than width of one scale-length; a more or less distinct series of dark spots low on sides alternating with the larger dark bands; nuchal band approximately one scale wide, incomplete mesially; top of head dark with some small lighter flecks or dashlike marks; belly checkered with black and greenish white; a sharp keel along middorsal line; 6 supralabials (rarely 5); ventrals 158; subcaudals 68 + 1 ..... *oxynota*
3. Belly checkered with black and yellow (white or greenish white) 5
   Belly never checkered with black and yellow 4
4. Above uniform black with a yellow collar; belly immaculate or with some scattered pigment; ventrals 129-151; caudals 34-67; supralabials 7-8 ..... *atrata*

Not uniform black above; reddish or reddish brown above with black cross bars (rarely lacking); a yellow collar followed by a black one; ventrals 131-147; subcaudals 36-70; supralabials and infralabials 7 ..... *sebae sebae*

5. Brown above on body with a series of about 25 (or less) zigzag transverse black bands, sometimes light-edged, or posteriorly broken medially and alternating, becoming smaller toward, and on tail; belly checkered, the dark marks tending to form a single median, or two outer bands, or the marks may be scattered.... *maculata*
Brownish with a broken series of fifty or more narrow, dark zigzag transverse marks usually broken anteriorly, usually fused on most of body; lower scale rows may have much black pigment appearing as black flecks; upper labials with rounding white spots; neck colored like body; belly checkered irregularly with black and greenish white; sometimes a small subocular present ..... *tessellata*

Ninia sebae sebae (Duméril, Bibron and Duméril)

Streptophorus sebae Duméril, Bibron and Duméril, Erpétologie Générale, vol. 7, pt. 1, 1854, pp. 515-517 (type locality, México).

Ninia sebae Dunn, Proc. Nat. Acad. Sci., vol. 21, 1935, pp. 10-11 (Costa Rica and numerous other localities).

Ninia sebae sebae Smith and Taylor, Bull. U. S. Nat. Mus. no. 187, 1945, p. 100.

I have seen no specimens of this species from Costa Rica. It is reported by Dunn, *loc. cit.*, from "upper Costa Rica."

The color is red or reddish above usually with black cross-bands, which tend to break mesially, and may alternate on the posterior part of the body. Towards the tail the bands may be reduced to small dots. There are usually 25 (or less) present or indicated on the body. There is a strongly-defined black collar preceded by a yellow band. The venter is immaculate or with some scattered pigment not, or only rarely, forming small spots, never checkered like *maculatus*.

See synopsis of the genus for diagnostic scale characters.

Ninia atrata (Hallowell)

Coluber atratus Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1854, p. 245 (Colombia [Venezuela] less than 200 mi. from Caracas).

Ninia atrata Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1875, p. 145 (San José, Costa Rica); Dunn, Proc. Nat. Acad. Sci., vol. 21, 1935, p. 11; Dunn and Bailey, Bull. Mus. Comp. Zool., vol. 86, no. 1, 1939, p. 7.

?*Streptophorus atrata* Boulenger, Catalogue of the Snakes in the British Museum (Natural History), vol. 1, 1893, pp. 293-295 (Cartago, Costa Rica).

See synopsis of the genus for a diagnosis of this form.

The Cartago specimens reported by Boulenger have 142 ventrals and 62 subcaudals in the male; 141, 155, 140 ventrals, and subcaudals 50, 53, 52 in three females. Dunn lists two specimens from Cariblanco and Cope reports the species from San José. I have seen two specimens in the U. S. National Museum from San José, Costa Rica (Nos. 38147-48). Both are typical in color.

Two specimens in Harvard M. C. Z. (Nos. 15292-93 from Cariblanco) have the ventral-subcaudal counts respectively, 130-34 and 126-44. The light color is five scales wide and includes the

posterior parts of the parietals, some pigment being present; supralabials 8, with small black spots at the back of each scale. The belly is completely immaculate except where the dorsal coloring edges onto the ventrals; mental and first infralabials with some black markings.

Ninia maculata (Peters)

Plate V, figs. 1-3

Streptophorus maculata Peters, Monatsb. Akad. Wiss. Berlin, 1861, p. 924 (type locality, Costa Rica); Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique at dans l'Amérique Centrale, livr. 9, 1883, p. 584, pl. 33, fig. 3.

A series of specimens (M. N. H. Nos. 25690-98) was obtained at Cervantes, a village situated between Turrialba and Cartago at the site of an old lava flow from Volcán Irazú. The small snakes were ensconsed under lava rocks.

The series shows a certain uniformity of color and markings, the color being brighter and the pattern more distinct in younger specimens. The ground color is reddish brown in younger specimens with small narrow cross bands usually some of which are broken and may tend to alternate on the two sides; towards the posterior part of the body the marks become less distinct, often represented by only small blackish lateral dots. Older specimens have more dark pigment scattered in the brown so that the dark markings are less distinct. The ventral surface is light with a single median series of quadrangular (rarely triangular) black spots, or two series, one on each side; or the spots may be irregularly scattered. See plate no. V. On the first scale row, very small black spots are present at irregular intervals, each smaller than a single scale. The underside of the tail is black.

There is a well-defined black nuchal band usually about as long as three scale-lengths; a band colored like the body is in front of this, three scale-lengths long but on the sides of the head it runs forward to the eye covering the outer edges of the parietals. The dorsal surface of the head is blackish or blackish brown, with occasionally a distinct black spot on the posterior tips of the parietals.

The following scale characters obtain: the part of rostral visible above forming a broad triangle, its length less than that of internasals; latter less than one third area of prefrontals; frontal shield-shaped usually distinctly hexagonal, as broad as long, its length equal to its distance from the tip of the snout; parietal large, its length equal to its distance from tip of snout; nasal not completely divided; loreal elongate, nearly twice as long as high; no preocular;

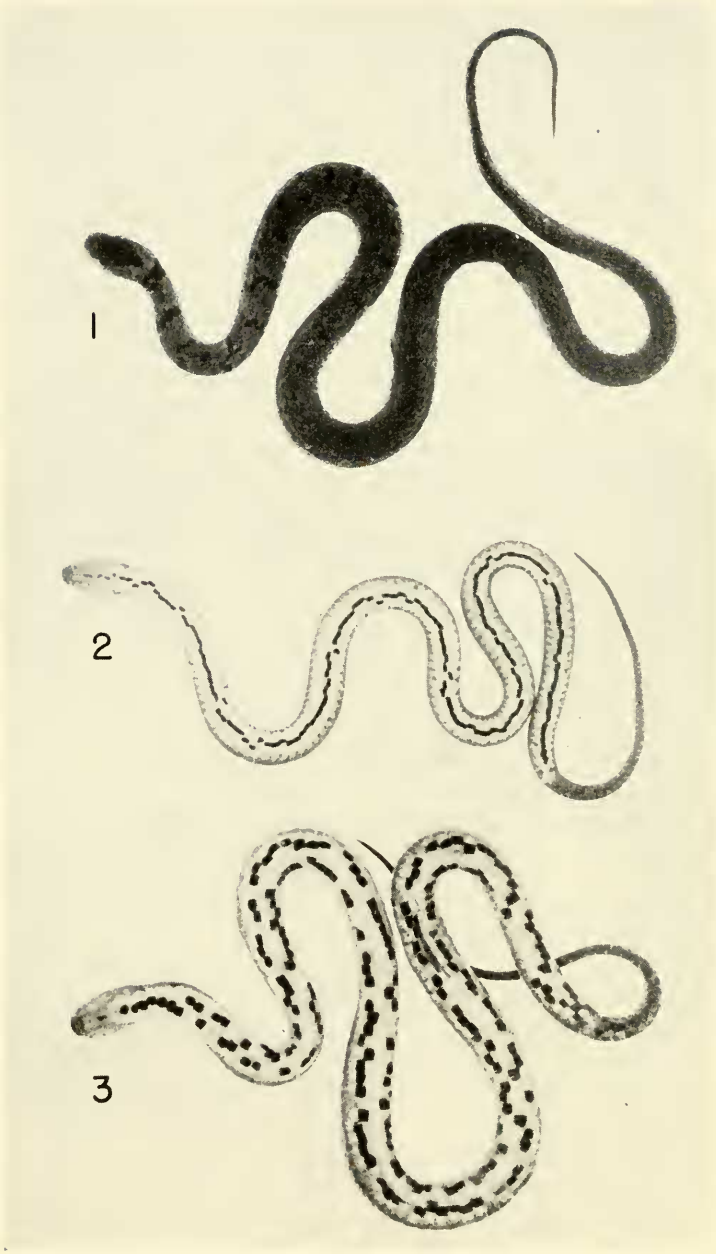


PLATE V. Fig. 1. *Ninia maculata* (Peters), RCT No. 297, Cervantes, Costa Rica, July 9, 1947; total length, 307 mm.

Fig. 2. *Ninia maculata* (Peters), RCT No. 1452, Cervantes, Costa Rica, August 26, 1947; total length, 229 mm.

Fig. 3. *Ninia maculata* (Peters), RCT No. 303, Cervantes, Costa Rica, July 9, 1947; total length, 268 mm.

postoculars two; temporals 1+2+3; supralabials seven, third and fourth entering eye; infralabials seven, the first four bordering the first chinshields, of which the first pair is nearly double the length and area of second pair; no scales intervene between ventrals and second chinshields. Scales striated strongly and all rows bearing a strong medial keel. Scale formula 19-19-17(19). Ventrals in the males range from 132-138; subcaudals 52-58; ventrals in females, 138-144; subcaudals 51-58. Total counts are 189-191 for males, 192-198 for females. Males have strong series of tubercles on mental, first pair of infralabials, the first chinshields and on some of the supralabials.

One specimen, also referred to this species, was collected on the Pacific drainage slope near the western base of Cerro de la Muerte at San Isidro El General. It differs in having the neck band nearly double the width of that of the Cervantes specimens and connecting by an isthmus to the black color on the head. The ventrals of this specimen are 139; the subcaudals 53.

It is probable that *Ninia maculata* is more closely related to *Ninia sebae* than to other Costa Rican species. The heavy black quadrangular markings on the venter of *N. maculata* will readily separate the two forms.

A series of Costa Rican specimens are in the U. S. National Museum. The variation in ventral count is 137-144, the average being about 140 (six specimens counted); subcaudals 48 to 55. Three exact localities are represented: Arriba, San José and Navarro.

Three specimens from Navarro, Costa Rica in the Harvard collection (M. C. Z. Nos. 15315-15317) have the following ventral and subcaudal counts respectively: 134-57, 141-48, 140-52.

Ninia tessellata Cope

Pl. 2, figs. 3 and 4

Ninia sebae tessellata Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 145 (type locality, ? Sipurio, Costa Rica by inference).

?*Streptophorus subtessellatus* Werner, Mitt. Naturh. Mus. Jahrg. 26, 1909 (1910), pp. 215-216 (type locality, "Carriblanco" Costa Rica); ? Amaral, Mem. Inst. Butantan, vol. 4, 1929, p. 10.

Ninia maculata Dunn, part, Proc. Nat. Acad. Sci., vol. 21, 1935, p. 11 (Canal Zone, Nicaragua, Costa Rica).

Five specimens of this species were obtained at Los Diamantes (R.C.T. Nos. 1364, 1445, 1447, 1448, and M.N.H. No. 25739) Sept. 1-8, 1947. All were found under logs.

Rostral about one third wider than high, barely visible above; internasals small, their length in that of prefrontals two and one

fourth times; prefrontals distinctly longer than wide entering the orbit; frontal about one fifth longer than wide, its length a little greater than its distance from snout tip, at least four times as wide as supraoculars; parietals elongate, equal to their distance from tip of snout; scales bordering parietals behind are not, or scarcely, enlarged; nasal divided; loreal large, quadrangular, entering orbit; preoculars normally absent (in some specimens where present they are segmented from the prefrontal if above loreal, from the third labial if below the loreal); two postoculars, the upper the larger; head scales finely striated with distinct tubercles on loreals; in males two anterior supralabials, mental, first four infralabials and both pairs of chinshields with tubercles. Scales of body strongly striate, the striation occurring also on outer edges of the ventrals. The scale formula 21-19-19-19, all rows strongly keeled; first chinshields double the area and the length of second pair. Two scale rows bordering the medial row are slightly larger than the medial scales; all three median rows tend to form a continuous keel, that of the median row not, or but slightly more elevated than the other two rows.

The ventrals and subcaudals total 175 to 184, the lowest numbers being those of the two females (175-178); the males vary between 182-184. The largest specimen measures: total length 279 mm., tail 59 mm. (R.C.T. No. 1364).

Color dark brown with a large series of narrow dark marks crossing back usually continuous but sometimes broken on median line. Occasionally dark marks on opposite sides alternate; black bands rarely wider than a scale length, but they follow the scales and the line tends to zigzag from scale to scale. Venter greenish with quadrangular markings; occasionally (as in No. 1364) median series of quadrangular marks distorted and each ventral with its posterior edge dark. Subcaudals nearly black but with some traces of lighter markings; top of head dark; labials with lighter cream areas more or less pigmented.

DATA ON NINIA TESSELLATA Cope

No.	Sex	Pre-oculars	Post-oculars	Temporals	Ventrals	Sub-caudals	Supra-labials	Infra-labials
1364	♀	1–1	2–2	1 + 2	130	45	7–7	7–7
1445	♀	0–0	2–2	1 + 2	134	44	7–7*	7–7
25739	♂	0–0	2–2	1 + 2	125	57	7–7	7–7
1447	♂	1–1	2–2	1 + 2	127	53	7–7	7–7
1448	♂	2–1	2–2	1 + 3	129	55	7–7	7–7

* The 6th labial is unequally divided transversely; also a segmented part from internasal present on one side.

I have examined the following specimens: Harvard M.C.Z. Nos. 19348-49, Salamanca, Costa Rica. They are typical in having 50 or more dark spots or bands; supralabials and infralabials 7-7. The three dorsal scale rows have keels somewhat more prominent than the other rows.

Four specimens from Guápiles (Nos. 15276, 77, 80, 81) agree in detail with the described specimen in most characters. The ventral-subcaudal counts are respectively: 132-47, 129-51, 131-53, and 130-53.

Two specimens in the U. S. National Museum from Arriba, Costa Rica (Nos. 93835-36) have the ventral-subcaudal counts respectively 126-54 and 127-55. The supralabials are 7-7, the infralabials 6-6 in both.

The types (Nos. 32568-32569, U.S.N.M.) have the supralabials and infralabials both 7-7. The ventral-subcaudal counts are respectively 128-60 and 130-60.

Ninia psephota (Cope)

Catostoma psephotum Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, (1876) 1875, p. 146 ("From higher points on the Pico Blanco, chiefly in the rainy zone at from 5000 to 7000 ft.").

Ninia psephota (part.) Dunn, Proc. Nat. Acad. Sci., vol. 21, 1935, p. 12.

This species was originally described in a genus, *Catostoma,* in which Cope included two species of small snakes from Costa Rica now regarded as belonging in the genus *Geophis.* However, it seems without question to belong to the genus *Ninia.*

The type was collected by the William Gabb Expedition on the higher parts of Pico Blanco, a high mountain in southern Costa Rica, at an elevation of from 5000-7000 ft.

The characters of the species are: scales in 17 rows, all striate, and all keeled except outer, those of the median row having stronger keels than the others; tail triangular in cross section; forehead somewhat convex; internasals four-sided; frontal with convex anterior border; prefrontal and large loreal entering orbit; nasal undivided; postoculars two, no preocular; temporals $1 + 2 + 2$; supralabials six, third and fourth entering orbit, the fourth directly below eye, the sixth longest; infralabials six, first pair in contact behind mental; anterior scales of chin tuberculate in males; anterior chinshields much longer than posterior; ventrals 162, anal single; subcaudals 73. Above uniform black; below black with half or less of an occasional scutum red, forming a tessellated pattern; only a few spots on the subcaudals. Total length 480 mm.; tail 128 mm.; to rictus oris 10 mm.; width of head (posterior) 8 mm.

Ninia oxynota (Werner)

Plate VI, figs. 2-3

Streptophorus oxynotus Werner, Mitt. Naturh. Mus. Hamburg, Jahrg. 26, 1909 (1910). (type locality "Carriblanco" Costa Rica).

This species, described from a pair of specimens, has been synonymized with *Ninia psephota* (Cope), but I regard this as a very doubtful arrangement. The species *psephota* has a uniform black coloration on back and sides, while the belly is black bearing numerous red marks. In *oxynotus,* the body is banded with grayish black or grayish blue, these bands separated by narrow brownish-white transverse lines less than a scale wide; the bands narrow somewhat low on the sides and a series of black spots alternate with them; the belly is tessellated in checkerboard style in black and greenish white.

That *psephota* and *oxynota* are related is suggested by the dorsal keel and the reduced number of labials.

Three specimens of this species are at hand, all taken at a point about 5 kilometers southwest of Isla Bonita at an elevation of from 6000 to 6500 ft. M. N. H. No. 25741: rostral one third wider than high, very narrowly visible above; internasals small, their length a little less than half length of the prefrontals, and about one third of their area; prefrontals about one fifth to one fourth longer than wide, entering the orbit; frontal as wide as long, equal in length to its distance from rostral, two and two-thirds times as wide as supraocular; parietals as long as their distance from the rostral; scales bordering parietals behind, enlarged; nasal divided; loreal large, nearly rectangular in shape, broadly entering eye; no preoculars (in M. N. H. No. 25740 a preocular is present on one side); two postoculars, the upper very large, the lower small, about one sixth the area of the upper; temporals 1 + 1 + 2 (No. 25740, temporals 1+2); supralabials 6-6 (in No. 25740, 7-7), the third and fourth enter the eye in both; infralabials six, the first four touch the first chinshields, which are nearly double size of second pair; diameter of eye less than distance from eye to nostril. The scales are dimly

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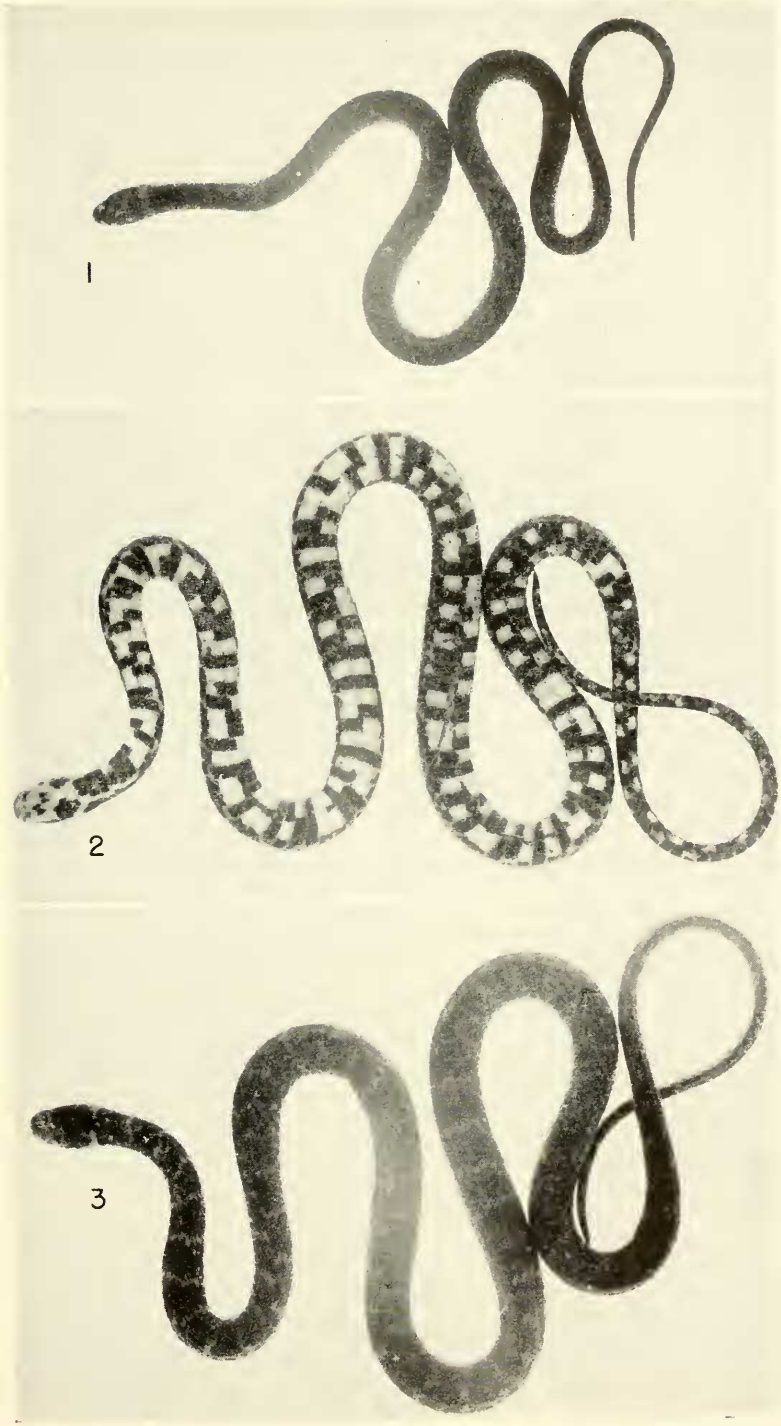
PLATE VI

FIG. 1. *Trimetopon pliolepis* Cope, RCT No. 655, 5500 feet elevation; Isla Bonita, Costa Rica; total length, 242 mm.

FIG. 2. *Ninia oxynota,* RCT No. 641, approximately 6 miles west Isla Bonita, August 3, 1947; total length, 395 mm. Ventral view.

FIG. 3. Same dorsal view.

PLATE VI



striate but distinctly keeled. Scale formula 17-17-17; ventrals 161; anal single; subcaudals, 70.

The color characters: General dorsal color brownish black with narrow transverse lighter bands of brownish varying from 54-64 in number. These indicated largely by lighter scale edges on one, or one and a half rows. Ventral surface irregularly banded with greenish cream and black. Sometimes a whole ventral scale light, or black, but more often scales parti-colored, the black being in angular spots; supra- and infralabials spotted black and greenish cream as are the chinshields. Dorsal head scales with eight brownish or cream markings.

This species has not been found outside the confines of Costa Rica. There it seems to occur only in mountains.

There are several Costa Rican specimens in Harvard M. C. Z. No. 15282 ♂, Navarro, has 157 ventrals and 76 subcaudals; No. 15283 ♂, Navarro, 152 ventrals, 73 subcaudals; No. 15313 ♀, "Costa Rica," 164 ventrals, 75 subcaudals; No. 28073 ♂, Estrella, 163 ventrals, 70 subcaudals. All of the specimens have six supralabials and six infralabials.

The following table records the chief variation in the three specimens collected:

TABLE OF DATA ON NINIA OXYNOTA

No.	Sex	Pre-oculars	Post-oculars	Temporals	Ventrals	Sub-caudals	Bands on body
641	♀	0–0	2–2	1 + 2	161	64 + 1	56 (53)
25740	♂	0–1	2–2	1 + 2	160	69 + 1	55
25741	♂	0–0	2–2	1 + 1 + 2	161	69 + 1	64

Genus DIPSAS Laurenti

Dipsas Laurenti, Specimen medicum exhibens synopsin reptilium . . . , 1768, p. 89.

Genotype: *Dipsas indica* Laurenti.

Six species occur in Costa Rica. One form described as *Dipsas ruthveni* (Barbour and Dunn) from Aguacate Mts., Costa Rica, is seemingly closely allied to *Dipsas anthracops* of Nicaragua and they may possibly be the same species. However they are here recognized as separate forms.

KEY TO COSTA RICAN SPECIES OF DIPSAS

1. Scales in 13 rows on middle of body ..... *anthracops*
   Scales in 15 rows on middle of body 2
2. Ventral-subcaudal count 300 or more 3
   Ventral-subcaudal count 290 or less 5
3. Four pairs of chinshields, the first separated from mental by first labials; 9 supralabials, fourth and fifth enter orbit; ventrals 215; subcaudals 135; yellow with

broad brown annuli, wider on anterior part of body.....*articulata*
Three pairs of chinshields; less than 9 supralabials..... 4
4. Head longer; eight upper labials, fifth and sixth enter orbit; ventrals (?), subcaudals 121. Dorsal color (?), belly yellow with brown cross-bands on anterior part of body, the posterior part with alternating brown spots; throat and lips spotted brown.....*pictiventris*
Head shorter; seven labials, the fourth, fifth and sixth border orbit; ventrals 202; subcaudals 121; first chinshields touch mental; brown cross-bands anteriorly; posteriorly with alternating spots.....*argus*
5. Scales 15-13; part of dorsal scales at least slightly enlarged; ventrals 165, subcaudals 79. Banded brown and whitish, the anterior bands three times width of interspaces (25 body bands, 13 caudal).....*ruthveni*
Scales 15-15; median dorsal scale row enlarged or not; chinshields touch mental... 6
6. Four pairs of chinshields, first small. Pale brown with dark brown rings; head brown spotted, two larger spots on parietals; ventrals 164-169, subcaudals 113-114 .....*annulata*
Three pairs of chinshields, the first largest. Greenish with a median series of light spots; ventrals 161, subcaudals 94.....*costaricensis*

Dipsas anthracops (Cope)

Leptognathus anthracops Cope, Proc. Acad. Nat. Sci. Philadelphia, 1868, pp. 108, 136 (type locality, "Central America").

Tropidodipsas anthracops Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, p. 297 (no specimen, Nicaragua).

Dipsas anthracops Dunn, Notulae Naturae no. 108, 1942, p. 7 ("Pacific side Costa Rica").

Twenty three yellow rings on body, twelve on tail separated by 9½ rows of scales anteriorly, and four rows posteriorly; yellow rings wider behind; these may alternate on belly, which is otherwise unspotted; no white marks on head; temporal region and nape yellow. Ventrals 177, subcaudals 76 (may be partly undivided); chinshields normal with groove between; first two pairs wider than long, third pair wider than long; temporals 1 + 2 + 3; no preocular; postoculars two; seven supralabials, eight infralabials. Scales in 13 rows, smooth; dorsals not enlarged, first labials in contact behind mentals.

This species has been reported on the Pacific side of Costa Rica by Dunn, *loc. cit.*

Dipsas pictiventris (Cope)

Leptognathus pictiventris Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 130, pl. 28, fig. 8 (type locality, E. Costa Rica); Günther, Biologia Centrali-Americana; Reptilia and Batrachia, Oct. 1894, p. 142; Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, p. 459 (thought to be a synonym of *argus*); Cope, Bull. U. S. Nat. Mus. No. 32, 1887, p. 66.

S[ibynomorphus] pictiventris Barbour and Dunn, Proc. Biol. Soc. Washington, vol. 34, 1921, p. 158 (Costa Rica).

Head longer and narrower than *argus;* scales in 15 rows, smooth, the lateral scales a little smaller than dorsals, but median series not enlarged; the elongate anterior chinshields touch mental, the first infralabials not being in contact; internasals somewhat triangular, frontal wide, nasal single; a presubocular below loreal; postoculars

two; supralabials eight, fifth and sixth enter orbit; temporals 1 + 2; seven infralabials; three pairs of chinshields, first elongate, one half longer than second pair; second and third pairs short and wide.

Belly yellow with brown cross bands on the anterior part of body; the posterior part with large alternating brown spots. Back occasionally crossed by spots. Throat and lips brown spotted. Ventrals ?, subcaudals 121.

The type specimen described by Cope is defective, and the all-important number of ventrals cannot be determined; at least 161 are present but it is certain that this does not represent the total number.

Boulenger has regarded *argus* and *pictiventris* as synonyms. An examination of the types leaves me with the opinion that they are distinct. The very bad condition of the type of *pictiventris* makes it impossible to ascertain all pertinent characters.

Dipsas argus (Cope)

Leptognathus argus Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 130, pl. 27, fig. 1, pl. 28, fig. 7 (type locality, Sipurio, Costa Rica); Boulenger, Catalogue of the Snakes in the British Museum (Natural History), vol. 3, 1896, pp. 458-459.

S[ibynomorphus] argus Barbour and Dunn, Proc. Biol. Soc. Washington, vol. 34, Dec. 21, 1921, p. 158 (Costa Rica).

This is an extremely slender snake, the body compressed; head wide, the snout short; rostral triangular, as high as wide, very small, scarcely visible from above; internasals small, the prefrontals large bordering orbit; frontal with parallel sides, equal to length of anterior border; supralabials seven, the fourth, fifth and sixth border the orbit; 2 postoculars; temporals 1-2; infralabials seven, the first pair not in contact behind the mental, four touching first chinshields; three pairs of chinshields, the two anterior pairs elongate, longer than wide, the third pair quadrate, smaller; scales in 15 rows, smooth, larger above than on sides, the median row not abruptly larger than those adjoining.

Ventrals 202,* anal single, subcaudals 121.

Color above, from the third row of scales, greenish ash, with two series of alternating light ocelli with black borders; lower on side the third scale row yellow with a series of black-edged ocelli like those of the back; on venter, blackish; speckled on the posterior half of the length. A large black-bordered ocellus on the nape; head vermiculated with black; lips yellow with black specks.

* I have counted only 202 ventrals in the type; 212 as given in the type description.

Dipsas articulata Cope

Dipsas brevis (not of Duméril, Bibron and Duméril) Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 266 (Cocuyas de Veraguas, New Granada).

Leptognathus articulata Cope, Proc. Acad. Nat. Sci. Philadelphia, 1868, pp. 107, 135 (Veraguas, Costa Rica [this may be in error]).

S[ibynomorphus] articulata Barbour and Dunn, Proc. Biol. Soc. Washington, vol. 34, Dec. 21, 1921, p. 158 (Costa Rica).

Body slender, strongly compressed, vertebral scales moderately enlarged. Loreal and prefrontal border eye; no preocular; two postoculars; temporals 2 + 3; nine supralabials, the fourth and fifth enter orbit; first pair of infralabials in contact behind mental; four pairs of chinshields. Scales in 15 rows; ventrals 215; anal single; subcaudals 135. Yellow with broad brown annuli surrounding body, wider on anterior part of body than on posterior, and wider than the interspaces of yellow; top and sides of head, supralabials in front of eye, and all infralabials brown; some short, white or yellow lines on head. Total length about 675 mm.; tail 225 mm.

I have not examined a Costa Rican specimen. It is retained in the list because of the report of Barbour and Dunn, *op. cit.*

Dipsas annulata (Günther)

Leptognathus annulatus Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1872, p. 30 (type locality, Cartago, Costa Rica); Biologia Centrali-Americana; Reptiles and Batrachians, 1895, p. 141, pl. 49, fig. C.

Leptognathus annulata Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, p. 457.

S[ibynomorphus] annulata, Barbour and Dunn, Proc. Biol. Soc. Washington, vol. 34, Dec. 21, 1921, p. 158 (Costa Rica).

A female specimen (No. 25702) was captured at Isla Bonita (American Cinchona Plantation) by Sr. Antonio Machado, Aug. 5, 1947, and presented to the collection.

Body distinctly compressed with broad thick head and large, protuberant eyes. Rostral not or scarcely visible from above, as high as wide; internasals subtriangular, about one third the length of prefrontals; latter very large, much wider than long, bending down on side and forming a part of orbit boundary; frontal much longer than wide, pentagonal, and about one sixth longer than its distance from tip of snout; parietals large (3.5 x 5 mm.), shorter than their distance from snout tip; supraoculars rather narrow, more or less angular behind, bending down somewhat behind eye; nasal single, pierced by the nostril, from which a small suture emerges terminating on the upper border; loreal, which replaces the preocular, longer than high; 2 postoculars; temporals 1+2+2; supralabials 7-7, increasing in size to sixth, the fourth and fifth entering orbit; infralabials 7-9; a small pair of scales inserted between the mental

and first very large pair of chinshields, each in contact with two labials; chinshields touch 4-5 infralabials, the last being very large; second pair of chinshields in contact, little more than half size of first pair; a third pair of chinshields in contact, somewhat larger than second pair, precedes first ventral; ventrals 169; anal single; subcaudals 113. Scale formula, 15-15-15, the scales all smooth apparently without trace of pits. The median scale row much enlarged.

Total length, 501 mm.; snout to vent, 330 mm.; tail, 171 mm.; width of head, 8.6 mm.; head length, 12.6 mm.

Banded red brown and raspberry pink, the brown bands becoming darker low on sides, and black below, the pink bands becoming white below; 27 red-brown bands on body, 18 on tail; these are two or three scales wide on median line, being a little broader on tail; on venter bands narrow and usually the width of two ventrals, while the white may occupy parts of three or four ventrals. Head brownish with an indefinite lighter pattern; the temporal areas being, on the whole, lighter than remainder. A distinct cream spot on fourth supralabial and a cream spot covering parts of fifth and sixth; infralabials and chin cream, with numerous brownish blotches.

Compared with the type description, the differences are indeed small. The type has a small subocular below the loreal that is wanting in this specimen. The type has 164 ventrals, and 113 subcaudals while this specimen has 169 ventrals and the same number of subcaudals. The specimen is somewhat larger, 501 mm. total length, compared to 440 mm., the length of the type.

Dipsas ruthveni (Barbour and Dunn)

Sibynomorphus ruthveni Barbour and Dunn, Proc. Biol. Soc. Washington, vol. 34, 1921, p. 158 (type locality, Aguacate Mts., Costa Rica); Werner, Zool. Jahrb., 1929, p. 189 (no specimens).

This form is close to *Dipsas anthracops* and it may be necessary to reduce it to the synonymy of that species.

Body strongly compressed anteriorly, less compressed along midbody region; tail diminishing suddenly in diameter behind vent; strongly compressed posteriorly; rostral pentagonal scarcely visible above; prefrontal large, broadly entering orbit; frontal longer than wide, about equal to its distance from tip of snout; nasal partially divided; loreal twice as long as high, entering orbit; no preocular; two postoculars; temporals 1+2; seven or eight supralabials, fourth and fifth enter orbit; first lower labials in contact behind mental; a pair of elongate chinshields; scales in 15 or 13 rows without apical

pits; the scale rows bordering the median row may be slightly enlarged.* Ventrals 165, subcaudals 79.

Banded brown and whitish; the brown bands anteriorly thrice as wide as the light bands, posteriorly nearly equal and of solid color; white bands clouded by groups of small darker streaks and flecks; bands diagonal, tending to alternate on belly; 25 bands on head and body; 13 on tail. Total length 425 mm.; tail 110 mm.

Dipsas costaricensis sp. nov.

Plate VII, text fig. 2

Type.—Mus. Nat. Hist. Univ. Kansas No. 25703, collected five miles southwest of Turrialba, on the Morehead finca, July 16, 1947; E. H. Taylor, collector.

Diagnosis.—Body moderately compressed, not noticeably slender; first labials not in contact behind mental; no preocular, median scale row not sensibly enlarged; ventrals 161, subcaudals 94. Lichen-green with a median series of light spots and with lateral and ventral ocellilike spots.

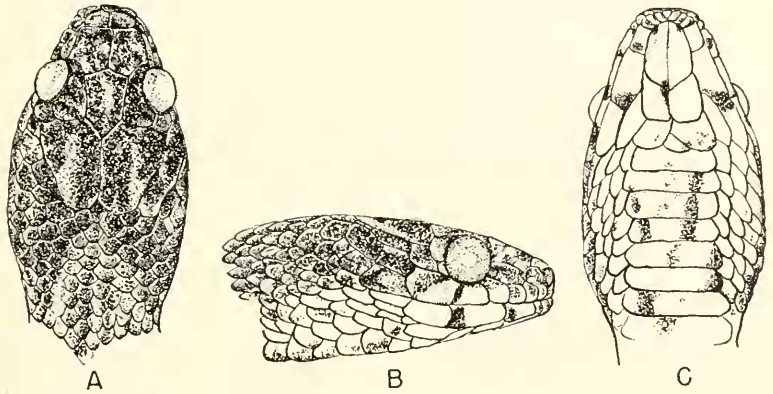


FIG. 2. *Dipsas costaricensis sp. nov.* Type. MNH No.25703. Morehead Finca, 4½ miles SW Turrialba, Costa Rica. A. Head dorsal view; B. Head lateral view; C. Head ventral view.

Description of the type.—Body more or less compressed, triangular in cross section, the head not much enlarged; eyes small; rostral small, not or scarcely visible from above, slightly broader than high; internasals small, a little less than one third length of the prefrontals, and about one fifth of their area; latter very large, a little

* The original description states "scales in 15 rows without apical pits, median row not sensibly enlarged or 13 rows with rows on each side of the median row slightly enlarged." This is not clear but since there was but a single specimen, both conditions must obtain in the same specimen.

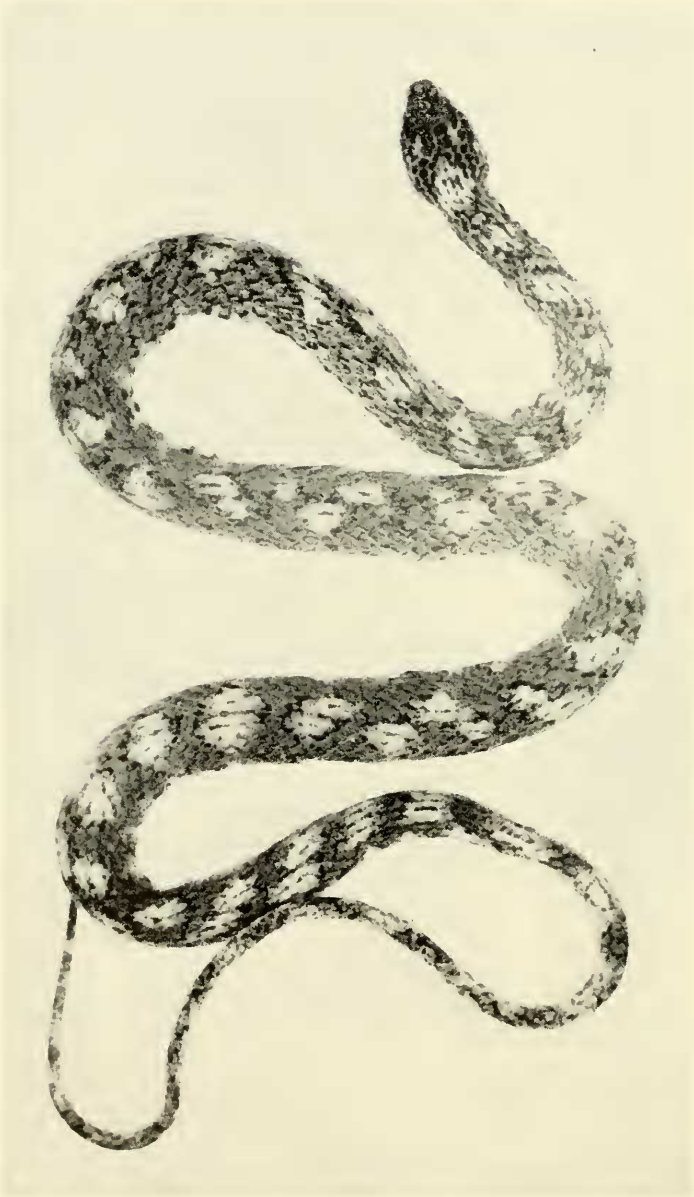


PLATE VII. *Dipsas costaricensis* sp. nov., MNH No. 25703, Morehead Finca, 5 miles SW Turrialba, Costa Rica. Total length, 47 mm.

broader than long, entering orbit for a distance equal to that of the loreal; frontal about one sixth longer than its distance from tip of snout, about one third longer than wide; parietals large (3.24 x 5 mm.) shorter than their distance from tip of snout; supraocular curving slightly, widest but not angular, posteriorly; nasal partially divided by a suture from nostril to upper edge of scale; loreal nearly twice as long as high, entering orbit; no preocular; 2-1 postoculars, the upper very large (the two fused on left side); temporals, 1+2+2 (2+2+2); supralabials, 7-6, the fourth, fifth and sixth (fourth and fifth) entering orbit; infralabials 6-6, four touching first pair of chinshields which are in contact with mental; second pair of chinshields in contact with each other, smaller than first pair; third pair in contact, irregularly shaped.

Scales smooth, without apical pits, the median dorsal row not enlarged; scale formula: 15-15-15; ventrals 161; subcaudals 94; anal single.

Color in life.—Lichen-green, the color interrupted on the scale edges by a variegated brown or black; a dorsal series of 33 brownish yellow blotches, variegated with dark brown and dusky markings on body; on tail there are 15-16 but these are rather indefinite; low on the sides and encroaching on the ventrals is a series of cream-white, dark edged, ocellilike markings; chin whitish with a faint yellow wash; neck and anterior fourth of body nearly pure white with small greenish or black flecks forming an irregular, indistinct, median line; there is more yellow color on latter three fourths of body; there are similar dark markings becoming more dense under tail with some greenish and yellow flecks. On dorsal surface the head is nearly uniform black-brown with some indistinct reddish brown marks; a divided white blotch below eye; chin with a distinct pair of black spots on the fourth labials and a few other less distinct flecks of greenish black.

Measurements.—Total length, 477 mm.; tail, 147 mm.; width of head, 9 mm.; length of head, 13.5 mm.; diameter of body, 10 mm.

Remarks.—This form differs from *argus* in having a much smaller ventral-subcaudal count (255 compared to 323 in *argus*); from *pictiventris* in a much lower number of subcaudals (94 compared to 121 in *pictiventris*) and a thicker body; from *articulata* in having mental touching chinshields and much lower ventral-subcaudal count (255 compared to 350 in *articulata*); from *annulata* in having the mental separated from the first chinshields, smaller ventral-

subcaudal count (255 compared to 277), and the median dorsal scale row not enlarged; from *ruthveni* by having the scale rows constantly 15, not reducing to 13, and a different color pattern.

Genus NEOPARIAS Günther

Neoparias Günther, Biologia Centrali-Americana; Reptilia and Batrachia, July, 1895, p. 178.

Genotype: *Neoparias bicolor* Günther.

A single Costa Rican species is referred to this genus.

This genus has quite incorrectly been associated with *Leptognathus* (*Sibynomorphus* or *Dipsas*); the striking character of the chinshields in *Neoparias* readily separate the two genera.

Neoparias bicolor Günther

Neoparias bicolor Günther, Biologia Centrali-Americana; Reptilia and Batrachia, July 1895, pp. 178-179, pl. 56, fig. C (type locality, Chontales Mines, Nicaragua).

Leptognathus bicolor Boulenger, Catalogue of the Snakes of the British Museum, vol. 3, 1896, p. 460.

S[ibynomorphus] bicolor Barbour and Dunn, Proc. Biol. Soc. Washington, vol. 34, 1921, p. 158 (Costa Rica).

Body slender, strongly compressed; tail slender; scales of the vertebral series not enlarged; scales on chin transverse, lacking a median groove; rostral small, scarcely visible above; internasals less than half size of prefrontals; frontal short, wide, about equal to its distance to rostral, only a little shorter than parietals; nasal apparently completely divided; a large square loreal entering eye, and a small preocular above it not reaching frontal; three or four postoculars; temporals $1 + 2 + 3 + 3$; supralabials 10-11, the fourth to seventh, or the third to sixth enter orbit; infralabials 11, the first pair fused together behind the small mental; three median azygos scales on chin, the first touching five scales; scales smooth, in 15 rows; ventrals 195; subcaudals 129.

Deep black with white rings completely encircling the body, the first around the neck, 14 around the trunk, 12 around the tail; the white rings half as long as the black interspaces; length about 516 mm.; tail about 192 mm. (from type description).

The species is arboreal, and perhaps because of this habit is very rare in collections.

Genus TRETANORHINUS Duméril, Bibron and Duméril

Tretanorhinus Duméril, Bibron and Duméril, Erpétologie Générale ou Histoire Naturelle Complète des Reptiles, vol. 7, pt. 1, 1854, pp. 348-349.

Genotype: *Tretanorhinus variabilis* Duméril, Bibron and Duméril.

Only a single species of this genus is believed to occur in Costa Rica.

Tretanorhinus nigroluteus nigroluteus Cope

Tretanorhinus nigroluteus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 298 (type locality, Aspinwall, Panamá [*fide* Dunn]).
Tretanorhinus nigroluteus nigroluteus Dunn, Copeia, 1939, no. 4, p. 216.

The presence of this species in Nicaragua and Panamá strongly suggests its presence likewise in Costa Rica, although I know of no Costa Rican specimens that have been reported.

The species has the following characteristics: blackish or olive brown on dorsum, usually with small alternating dots on each side, the dots variable in size, usually covering about one scale; two lower scale rows lighter in color tending to form a stripe anteriorly; venter light yellowish or whitish, sometimes with dots or a suggestion of a midventral darker line; a dark streak on sides of head.

Nasals in contact behind rostral or narrowly separated; internasals distinct, small, longer than wide; frontal as long as its distance from end of snout, shorter than parietals; eight supralabials, the fourth entering the orbit; normally two preoculars, two postoculars and usually two loreals; ventrals of southern specimens 133-149; the subcaudals 56-80; scales in 21 rows.

This form is aquatic and is said to frequent salt water, mangrove swamps.

Genus SIBON Fitzinger

Sibon Fitzinger, Neue Classification der Reptilien, 1826, p. 31.

Genotype: *Coluber nebulatus* Linnaeus.

A single species is known.

Sibon nebulatus Linnaeus

Coluber nebulatus Linnaeus, Systema naturae, ed 10, vol. 1, 1758, p. 222 (type locality, "Africa [presumably in error]).
Coluber sibon Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, p. 222.
Sibon nebulatus Taylor, Univ. Kansas Sci. Bull., vol. 26, 1939 (1940), pp. 473-474.
?*Sibon annulata* Dunn and Bailey, Bull. Mus. Comp. Zool., Harvard Coll., vol. 86, 1939, p. 9 (Costa Rica).
Leptognathus nebulata Cope, Journ. Acad. Nat. Sci. Philadelphia, 1876 (1875) p. 131 (southeastern Costa Rica).

This very widespread species is not common in collections and is relatively little known. The following characters will permit a diagnosis: maxillary short, with 15-16 short teeth decreasing in size posteriorly; rostral visible above as a narrow line, not reaching level of dorsal surface of head; internasals and prefrontals normal, the latter entering orbit; frontal pentagonal, as long as (or a little longer than) its distance from tip of snout; parietals a little longer than wide, their length less than, or approximately equal to their dis-

tance from prefrontals; nasal completely divided; loreal large, rectangular, entering orbit; no preocular; postoculars two or three; temporals 1 + 2; supralabials seven, the fourth and fifth or fourth, fifth and sixth entering orbit; five or six infralabials touch anterior chinshields, which are longer than second pair; a third pair of chinshields may be present, the scales of which are wider than long.

Scale rows 15-15-15, or the preanal count may reduce to 13; scales smooth without pits. Ventrals 170-197; subcaudals 73-102; anal single; probably not exceeding a meter in length; known length, 790 mm.; head large and distinct from neck; eye large, the pupil vertically elliptic, the body somewhat compressed.

Gray or whitish above marked with numerous irregular transverse black or brown markings which may extend across body or may be broken into two or three parts, the edges of which are very irregular; some scales bordering spots may be pure white; a nuchal dark spot bordered by white dots; head marked with dark spots; a dark line from eye to jaw; upper labials whitish; chin and lower surfaces white with a series of more or less alternating quadrangular dark spots on the sides of the venter with small flecks scattered between.

Two specimens in the U. S. National Museum numbered 30621, 30622 are a part of the early collection made by William Gabb. They agree in most characters with the given description. No. 30621 has 185 ventrals and 99 subcaudals, the anal single. There are approximately 40 bands. The head is brown with numerous white flecks, which tend to form a symmetrical pattern. No. 30622 has 171 ventrals and 85 subcaudals. There are 41 bands. The maxillary teeth are 14, slender, curved, none grooved. The posterior part of the maxillary forms an elevated ridge.

It is presumed that the two listed specimens were taken in southeastern Costa Rica, where much of the William Gabb Collection was made.

The species has been reported also from Guápiles in the eastern lowlands.

Genus XENODON Boie

Xenodon Boie, Isis, 1827, p. 540.

Genotype: *Xenodon inornatus* Boie (*fide* Fitzinger).

Two forms are known to occur in Costa Rica.

KEY TO COSTA RICAN SPECIES OF XENODON

Body marked with large paired lateral spots, discrete anteriorly, often touching posteriorly ..... *bertholdi*

Body marked with large irregular saddlelike blotches..... *colubrinus*

Xenodon bertholdi Jan

Xenodon Bertholdi Jan, Arch. per la Zool., 1863, pp. 318-319 (same in separate, pp. 108, 109) (type locality said to be "Mexico." Very doubtful).

The type description of this species gives the following characters: one preocular, three postoculars; temporals 1+2; supralabials eight; ten infralabials, six touching the chinshields; 19 scale rows and 13 rows behind anus; ventrals 153, anal single; subcaudals 42. On each side of the trunk is a series of large oval spots separated from each other mesially.

The color pattern of a snake captured at Turrialba (K. U. No. 25167) closely approaches the color characters of the type of *X. bertholdi*. In this specimen the spots are outlined in black, and bordered by light ash-gray; six of the fourteen spots are separated on the middorsal line, the others being narrowly in contact.

In this specimen a pair of gray lines, spotted and flecked with black, passes back from the eye to a point on the neck across jaw angle. The area between these lines is rather brownish fawn. A character that may be of significance is that the supraoculars are not truncate on their posterior border, but extend a noticeable distance behind the posterior end of the frontal. A pair of black spots are present on the prefrontals. The labials are brownish fawn and the chin and neck as far back as fifth ventral are white. The anal scale is white. The venter is covered with flecks of pigment, scattered irregularly. The subcaudal area has a peppering of black at the base, but is nearly cream-white near the tip.

A specimen (M. C. Z. No. 19238) from Limón, Costa Rica has a paired series of large spots on the anterior half of body, while between them are small dark medial spots. Paired spots on posterior part of body fused mesially. Ventrals 145; subcaudals 44; scales, 19-19-17 with single apical pits on dorsal scales; supralabials 8-8; infralabials 10-11, five (or six) touching first chinshields which are twice size of second pair.

A specimen in the U. S. National Museum, No. 37482 (or 3) from Esparta, Costa Rica, has 150½ ventrals and 46+ subcaudals.

If the type of this species actually is Mexican, it bespeaks a wide range for the form.

Xenodon colubrinus Günther

Xenodon colubrinus Günther, Catalogue of Colubrine Snakes in the Collection of the British Museum, 1858, pp. 55-56 (type locality, Pará, Brazil).

The type of *Xenodon colubrinus* has the following scale characters: scales smooth in 19 rows; one preocular, two postoculars; two nasals, the nostril very large; anal single; 151 ventrals, 45 subcaudals;

14 lozenge-shaped, pale-edged blotches on the trunk, four on tail. Head elongate, snout protruding, angular in front. Rostral just visible above; frontal about as long as wide; parietals short; loreal large, nearly square; eight supralabials, the fourth and fifth touch eye. Head dusky; a brown marbled streak from the back edge of eye to mouth angle; belly yellowish brown marbled.

The following additional characters obtain: rostral one and one-third times as wide as high; frontal as long as wide, the length reaching to middle of internasals; parietals a little wider than long, their length equal to that of frontal; supraoculars truncate behind, not extending back beyond level of frontal; first chinshields one and one-half times size of second pair which are nearly separated by the scales following. The scales on sides form diagonal series.

The two Costa Rican specimens acquired by gift from Mr. Virgil Cave agree in general with the characteristics of the type. It is difficult to state the variational limits of this species since no recent revisional work has been done on the genus, and the name as now understood is probably composite.

TABLE OF DATA FOR XENODON COLUBRINUS GÜNTHER

No.	Sex	Ventrals	Subcaudals	Supralabials	Infralabials	Labials enter orbit	Labials contact chinshields
851	♀	151	45	9–9	11–11	4^{th} 5^{th} / 5^{th} 6^{th}	5–5
1001	♂	144	..	8–8	11–11	4^{th} 5^{th}	5–5

TABLE OF DATA FOR XENODON COLUBRINUS GÜNTHER (concluded)

No.	Scale formula	Anal	Preocular	Postocular	Temporals	Bands on body	Teeth
851	17–19–17	1	1–1	2–1	1 + 2	13	14 + 2
1001	17–19–17	1	1–1	3–1	1 + 2	13	13 + 2

Genus ENULIUS Cope

Enulius Cope, Proc. Amer. Philos. Soc., vol. 11, 1871, p. 559.

Genotype: *Enulius murinus* Cope = *Enulius flavitorques* Cope.
One species is known in Costa Rica.

Enulius flavitorques Cope

Liophis flavitorques Cope, Proc. Acad. Nat. Sci. Philadelphia, 1868 (1869), p. 307 (type locality, Magdalina River, Colombia).

Drepanodon ? flavitorques Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, p. 639 (no specimens).

Enulius flavitorques Dunn, Proc. Acad. Nat. Sci. Philadelphia, vol. 89, 1937 (1938), pp. 415-417 (Costa Rican records Marivalles, Barranca and Cartago).

I have seen no specimen of this form from Costa Rica. The salient characters are as follows:

Rostral projecting and well visible above; frontal very broad, with a long-produced posterior angle; internasals about as long as wide; prefrontals considerably wider than long; nasals higher than long, narrower than loreal; preocular higher than long; loreal higher than long, the suture straight above, angulate below; postoculars two; temporals 1 + 2; supralabials seven, all higher than long except last; third and fourth enter orbit; infralabials seven, fourth elongate, first pair in contact behind the mental; posterior chinshields half as long as anterior, separated by a scale; scales in 17 rows. Ventrals 188; anal divided; subcaudals 105. Total length about 420 mm.; tail about 132 mm. Uniform dark brown above with a broad yellow half-collar crossing the posterior part of the parietal shields and two transverse rows of scales; venter dirty yellow.

There is some doubt that the form *Enulius murinus* Bocourt [= *Enulius longicaudata* (Cope)] is a synonym of this species. It is not impossible that the latter is the proper name for the Costa Rican species, but the matter cannot be decided now.

This species is reported as having single apical pits on the scales. It may readily be separated from *Enulius sclateri,* which has four (two pairs) apical pits on the dorsal scales.

I have examined casually a series of specimens of this species from Honduras and Panamá. There is considerable difference in the head marking and nuchal band. Its presence in Costa Rica is attested by Dunn's records, *loc. cit.*, from Marivalles, Barranca and Cartago.

Enulius sclateri (Boulenger)

Plate VIII, text fig. 3

Leptocalamus sclateri Boulenger, Catalogue of the Snakes in the British Museum, ed. 2, vol. 2, 1894, p. 251, pl. xii, fig. 1 (type locality, "South America"); vol. 3, 1896, p. 641 (Guásima, Costa Rica).

Enulius slateri (*sic*) Dunn, Proc. Acad. Nat. Sci. Philadelphia, vol. 89, 1937 (1938), p. 417; Smith and Taylor, U. S. Nat. Mus. Bull. no. 187, 1945, p. 61.

This species is known in literature from the type description, and from some brief notes given by Dunn, *loc. cit.* The specimen here described was captured at Los Diamantes (near Gúapiles, Costa Rica) by Richard C. Taylor. It was discovered by chopping to pieces a rotting log in which the snake was concealed. The following characters obtain:

Rostral at least twice as broad as high, its border along internasals almost straight rather than angular, the length of part visible above a little more than half length of internasals; suture between internasals equal or larger than that between prefrontals, but the scales much shorter than prefrontals which enter eye; frontal much longer

than broad, four-sided, its length one and one-half times greater than its distance from tip of snout; parietals elongate, a little longer than the frontal; supraocular reduced, but extending above more than half of the eye; nasal divided, anterior part the larger, containing most of nostril; loreal elongate forming part of border of eye; two postoculars, the upper somewhat the larger; temporals, 1 + 2, the anterior rectangular, touching both postoculars; seven supralabials in following order of size: 1, 2, 5, 4, 3, 7, 6, (1, 2, 4, 5, 3, 7, 6), third and fourth entering orbit; six lower labials in following order of size: 2, 1, 5, 4, 3, 6, first labials in contact behind mental; first chinshields in contact anteriorly, separated posteriorly by a median diamond-shaped scale; second pair of chinshields widely separated; two scale rows separate first ventrals from labials.

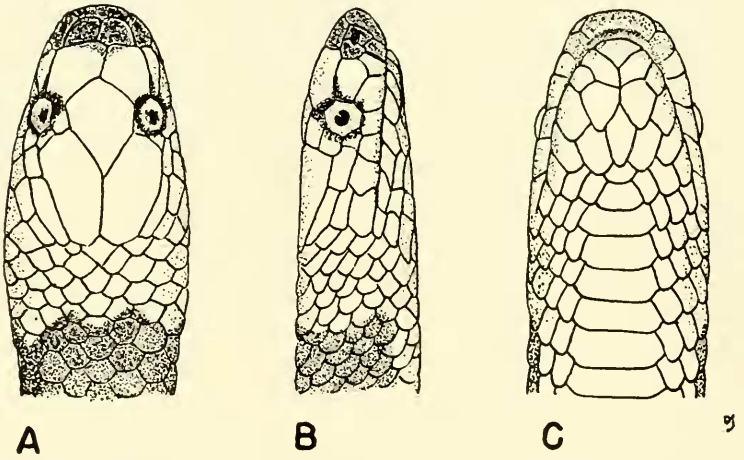


FIG. 3. *Enulius sclateri*. R.C.T. No. 1368. Collected, Los Diamantes, near Guápiles, Costa Rica. A, Head, dorsal view; B, Head, lateral view; C, Head, ventral view. ×4.

Scale formula, 19-15-15-15; scales smooth, the anterior 20 transverse scale rows each with four scale pits, two anterior, two posterior, the latter appearing slightly the smaller; no pits apparent on other scales; ventrals 145; anal divided; caudals 96 + 1.

Above blue-black, the scales on sides showing slightly lighter edges· chin, throat and venter as far as anal opening, white, the lateral color not extending onto the edges of ventrals; usually a whitish area on the scales of the outer row; caudals with a median dark line beginning behind vent; the color of outer scale rows encroaches somewhat on edges of subcaudals so that they appear grayish with some dim lighter areas. The head is pure white with a dark ring

surrounding the eye and a black spot covering first labial, rostral, internasals, nasals, and a small triangular area on the prefrontals.

The measurements (in mm.) are as follows: width of head, 6; length of head, 10.2; total length, 345; tail, 135.

The specimen is a male and it agrees with the type specimen in most characters. The known ventral range is 132-151; subcaudals 97-98.

PLATE VIII. *Enulius sclateri* (Boulenger), RCT No. 1368, Los Diamantes, Costa Rica, September 6, 1949; total length, 345 mm.

I have examined two Harvard specimens, M. C. Z. Nos. 28079-80, from Peralta, Costa Rica. These agree with the described specimens.* Specimens are known from Gúasimo and Finca Hamburg.

Genus HELICOPS Wagler

Helicops Wagler, Natürliches System der Amphibien, 1830, p. 170 (*part.*)

Genotype: Helicops angulatus Linnaeus.

A single species has been reported from Costa Rica.

Helicops wettsteini Amaral

Helicops wettsteini Amaral, Bull. Antiv. Inst. Amer., vol. 3, no. 2, p. 40 (San Juan de Viñas [1000 m. alt.] base of Volcán Turrialba, central Costa Rica).

This species may be readily recognized by the contact of the nasal scales behind rostral.

Eye small; rostral wider than high, visible from above; nasals in contact behind rostral; internasal single; prefrontals separate; frontal once and two-thirds times as wide as long, as long as its distance from the end of snout, shorter than the parietals; loreal higher than long; one preocular, two postoculars; temporals 1 + 2; supralabials eight (8-9 in paratype), the fourth and fifth border orbit; anterior chinshields longer than posterior, touching five or six lower labials; scales in 19 rows, smooth; ventrals 128; anal divided, subcaudals 37-38. Total length, 375 mm., tail 50 mm.

The color is uniform dark plumbeous above; light underneath with a median interrupted black streak and a blackish line along outside border of ventrals.

The species is known from the two types, collected at Juan Viñas (San Juan de Viñas, 1000 m. elev.).

Genus HYDROMORPHUS Peters

Hydromorphus Peters, Monatsb. Akad. Wiss. Berlin, 1859, p. 276.

Genotype: *Hydromorphus concolor* Peters.

A single species is known from Costa Rica.

Hydromorphus concolor Peters

Hydromorphus concolor Peters, Monatbs. Akad. Wiss. Berlin, 1859, pp. 276-277 (type locality, Costa Rica).

This medium-large snake still remains rare in collections. The uniform color, smooth scales, small eye, single prefrontal, and the nostril directed upward piercing a single scale, readily identify the

* A specimen, Harvard M. C. Z. No. 34382 (Canal Zone, Atlantic Side), differs in having the rostral, prefrontals, internasal, anterior part of frontal, and area about eye, black except that the nostrils are whitish; second, third and fourth labials white except about eye; two small black areas on lower lips; the neck ring includes the back of head and four transverse scale rows.

species. The following characters are those of the type.

Head depressed, with broadly rounded snout; nasals separated by a pair of very small internasals; prefrontals much broader than long; frontal slightly longer than broad, as long as its distance from the rostral, much shorter than parietals; loreal entering orbit, twice as long as high; one small preocular; two postoculars; temporals 1 + 2; six supralabials, third entering orbit; four labials touch first pair of chinshields; posterior chinshields reduced; scales in 17 rows, smooth; ventrals 175; anal divided; subcaudals 31.

Dark grayish brown on dorsal surfaces, the sides and venter paler, the scales being partly yellowish. Total length 850 mm.; tail 86 mm.

A specimen in the U. S. National Museum (No. 13537) from San José, Costa Rica has the rostral much broader than high, one half or more of its surface visible above; internasals fused but with a small entrant suture; prefrontals fused into one scale, 2½ times wider than long; frontal small, as wide as long, shorter than its distance from tip of snout; parietals equal to their distance from tip of snout; nasal single, pierced in the anterior half of scale; the loreal and preocular both enter orbit; two postoculars; supraoculars small; temporals 1 + 2 + 2 (a small scale severed from the front temporal on one side); supralabials 6-6, the third only entering orbit; infralabials 9-8, four touching chinshields; two pairs of chinshields, the first largest, the second pair separated by two scales; scale formula 19-17-15; ventrals 174½; subcaudals 40; anal divided.

The specimen is uniform dark brown, the scale centers lighter on sides of body.

Genus TRIMETOPON Cope

Trimetopon Cope, Proc. Amer. Phil. Soc., vol. 22, 1884, p. 177.

Genotype: *Ablabes gracilis* Günther.

This genus as here considered may be composite. Four forms are known to occur in Costa Rica. The forms of *Trimetopon (sensu strictu),* having 15 scale rows and a fused prefrontal are kept with forms having the prefrontals separated and 17 scale rows.

KEY TO COSTA RICAN SPECIES OF TRIMETOPON

1. Prefrontals fused; scales in 15 rows 3
   Prefrontals fused or separate; scales in 17 rows 2
2. Prefrontals separate; seven supralabials; throat white, venter red; a black streak from eye to suture of fourth and fifth labials; ventrals 163; subcaudals 33 ..... *viquezi*
   Prefrontals fused; eight supralabials; ventrals 154 ♂; subcaudals 69; throat and venter yellow; no apical pits; first chinshields twice size of second pair ..... *pliolepis*
3. Ventrals 122, subcaudals 69; one preocular, two postoculars; seven supralabials; black above, and white below on venter; head white as far forward as middle of frontal including third labial; a black spot on seventh labial ..... *simile*
   Ventrals 141-149; subcaudals 60-69 (65); a tendency to form lateral dark stripes; a neck band; single apical pits; chinshields subequal in size; yellowish below ... *gracile*

Trimetopon pliolepis Cope

Trimetopon pliolepis Cope, Proc. Acad. Nat. Sci. Philadelphia, 1894, p. 201; Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, p. 636.

Trimetopon gracile (part.) Dunn, Copeia, 1937, no. 4, pp. 214-215 (The part referable is the *Trimetopon plioplepsis* [*sic*] stated by Dunn to have appeared in Cope, Proc. Amer. Philos. Soc. 22, 1885:177. This is incorrect since the species was not described until 1894, and in another publication. See above).

Rostral not visible above, small internasals much wider than long; anterior border of frontal slightly convex forward; lateral border of frontal shorter than the parietal border, "which forms less than a right angle with that of the opposite side"; loreal longer than high; one preocular well separated from frontal; one postocular; temporals 1 + 1; supralabials 8, fourth and fifth entering orbit, all longer than high except eighth; infralabials 8; posterior chinshields half size of anterior pair; scales 17, without pits (fossae).

Total length 287 mm.; tail 76 mm.; ventrals 154; anal divided; subcaudals 69.

Dark brown above, the scales with a paler, minutely speckled center except those of third row; this, together with the more restricted pale centers of the scales of the first and second rows gives the appearance of a dark lateral band which tips the ventrals. Below uniform yellow; a narrow yellow collar borders but does not cross the extremities of the parietals; each upper labial with a large yellow spot next the border; that at the top of the sixth and the front of the seventh has the effect of a postocular band. (From type description.)

Cope does not specifically state that the prefrontals are fused but one infers this since he does not mention any difference in this respect from *gracile* when he compares the forms.

Two specimens were collected in Costa Rica. R.T.C. No. 655 was taken at Isla Bonita at approximately 5500 ft. elevation and R.C.T. No. 1458 was taken at Los Diamantes at about 900 ft. elevation by Richard C. Taylor. The difference in elevation is nearly 4600 feet. Both are referred to this species despite certain discrepancies in characters.

No. 1458 ♀. The following scale characters obtain: part of rostral visible above, a broad triangle, much smaller than an internasal; internasals small, the common suture one-fourth times as long as the fused prefrontals; latter scale not twice as wide as long, minutely entering eye, its posterior edge nearly a straight transverse line; pentagonal, its width four-fifths of the length, its length one-fourth greater than its distance from the snout tip; parietals very large,

the length one-fifth to one-fourth greater than its distance from snout tip; nasal at least partially separated; loreal present, longer than high; a small preocular; supraocular about one third of the width of the frontal; one postocular; temporals 1 + 1 + 2; supralabials eight, the fourth and fifth border eye; infralabials 7-8, there being four (or five) touching the anterior chinshields; latter scales twice as long as posterior and more than twice their area; scale formula, 17-17-17, all smooth without pits; ventrals 141; subcaudals 59; anal divided; total length, 228 mm.; tail 60 mm.

Above brown, the edges of the scales having deeper brown or blackish edges, the centers being light brown or fawn resulting in a pattern of indistinct dark and light lines. These dark lines vary in thickness; one on lower and one on upper edge of first scale row; one on edges of third and fourth rows; a narrower line on edges of sixth and seventh; the median scale row is almost entirely dark.

The light lines on first and second rows are most distinct; two lower dark lines merge into a single dark line on base of tail; head brown flecked and mottled with fawn; a pair of narrow light spots converge on the back point of frontal; first supralabials with irregular cream spots; a larger more prominent spot on sixth labial but extending onto adjoining scales; dark spots on infralabials; a distinct cream bar across neck; chin, venter, and under side of tail cream; the extreme outer edges of ventrals dark brown.

No. 655, differs in a few characters. The anterior part of frontal forms a curved line. On right side third and fourth labials are fused, thus only third labial enters eye; on left side the third labial transversely severed thus making an "extra" loreal. The part of rostral visible above smaller than in preceding specimen; labial markings nearly the same, and light markings on frontal borders only dimly evident; temporals 1 + 1 + 1; scales 17-17-17; ventrals 143; subcaudals 73. Total length, 242 mm.; tail 73 mm. The frontal region is somewhat broader, and the dark stripes are only dimly evident. The length of the labials in relation to height varies somewhat from the type.

I examined two specimens at the Harvard Museum of Comparative Zoology from La Palma, Costa Rica collected and identified by Dunn as *Trimetopon gracile.*

These are Harvard M.C.Z. No. 28049 (with 148½ ventrals, tail incomplete; 8-8 supralabials, 8-8 infralabials; prefrontals fused; scales 17-17-17 rows; second chinshields small, about one-third size of first pair; keels present above anal region) and No. 28050 (ventrals 148; subcaudals 69; a white line from eye to lip).

A specimen in the U. S. National Museum, No. 75036 from San José, Costa Rica has the following characters: rostral narrowly visible above; internasals small, their length in prefrontal length approximately 2-2 5 times; prefrontals fused, twice (or more) size of frontal; frontal equals its distance to snout tip; parietals elongate, one-sixth longer than snout; loreal longer than high; one preocular, one postocular, the latter distinctly the larger; temporals 1-1; 8-8 supralabials; 8-8 infralabials, five touch first chinshields which are thrice area of second pair; first labials form a suture; 153 ventrals (the first separated from the posterior chinshields by four scales); anal divided; subcaudals 70 + 1.

A nuchal band, divided; a pair of symmetrical white spots on back of frontal and a similar pair on edges of parietals; an irregular white line crosses snout on rostral and internasals, goes onto labials terminating at lip; a light spot below eye to seventh labial; head otherwise brown flecked; chin immaculate except mental and the two labials on each side; body scales brown with elongate dashlike lines of varying width thus appearing as light and dark stripes of varying width and distinctness; body color encroaches on ventrals but venter chiefly immaculate cream white.

Trimetopon viquezi Dunn

Trimetopon viquezi Dunn, Copeia, 1937, no. 4, p. 215 (type locality, Siquirres, Costa Rica).

The following characters appear in the type description: Nasal semidivided; two prefrontals; one preocular, two postoculars; temporals 1-1; supralabials seven, the third and fourth border orbit; infralabials eight, four touching the anterior chinshields which are separated from the mental and are longer than the posterior; dorsal scales in 17-17 smooth rows, save a few keeled scales on sides above anus; ventrals 161 + 2; caudals 33 +. The total length is 209 + (part of tail missing).

Black above, each scale with a white streak at base except those of the vertebral and the fourth row, resulting in a dark vertebral line and a dark lateral line; throat white; belly and under side of tail red; a black streak from eye to suture of labials four and five; a white streak from eye onto the sixth and seventh labials; a white streak from side of neck crosses the seventh labial; anterior labials spotted black and white.

I have not seen the type, which is from Siquirres, Costa Rica.

Trimetopon simile Dunn

Trimetopon simile Dunn, Occ. Papers Boston Soc. Nat. Hist., vol. 5, 1930, p. 331 (type locality, Reventazón, Costa Rica [= La Junta], later stated to be Siquirres).

Prefrontals fused into a single large scale. Scales in 15 rows; one preocular; two postoculars; temporals 1 + 1; supralabials seven, the third and fourth border eye; infralabials seven, four touching the anterior chinshields, which are longer than posterior pair.

Ventrals 122; anal divided; subcaudals 69. Black above, white on ventral surface; head white as far forward as middle of frontal and including third labial; a black spot on seventh labial. Total length, 155 mm.; tail, 50 mm.

I have seen only the type.

Trimetopon gracile (Günther)

Ablabes gracilis Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, Jan. 1872, p. 18, pl. 3, fig. D ("Elevated country near Cartago").

Trimetopon gracile Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, pp. 184-185 (Boulenger gives the count of ventrals as 141-149 for the two cotypes, and 60-65 for the subcaudal counts; that given in the type description is ventrals 149, subcaudals 69); Dunn, Copeia, 1937, no. 4, Dec. 31, pp. 214-215.

The characters of the type are: body and tail slender, subcylindrical; head narrow, not distinct from neck; rounded rostral very broad and low; very small narrow internasals; prefrontals fused into a single large scale; frontal broad and long, five-sided with the posterior angle produced and pointed; parietal length equal to frontal and prefrontal length together; nostril between two small nasals; loreal longer than high; one preocular not reaching upper surface of snout; one postocular; seven supralabials, the third and fourth border eye; temporals 1+1+2; first infralabials in contact; chinshields, two pairs subequal in size; scales 15 rows, smooth, with single apical pits; ventrals 149, subcaudals 69. Length approximately 300 mm.

Upper parts nearly uniform blackish brown, the anterior and lateral scales somewhat lighter in the center; an indistinct narrow brownish collar; lower parts yellowish.

Boulenger, *loc. cit.*, adds certain data, presumably taking into consideration a second specimen: "seven or eight upper labials, third and fourth or fourth and fifth entering the eye; four or five lower labials in contact with the anterior chin-shields, which are longer than the posterior."

As for the color, Boulenger states, "Dark brown above, with five blackish longitudinal lines; a more or less distinct yellowish collar;

lateral scales lighter in the centre; labials yellowish, spotted with black; lower parts uniform whitish."

Günther's figure shows the anterior and posterior chinshields as of approximately the same size, and the parietal longer than its distance from the tip of the snout.

Genus HYPSIGLENA Cope

Hypsiglena Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 246.

Genotype: *Hypsiglena ochrorhynchus* Cope.

A single species occurs in Costa Rica.

Hypsiglena torquata torquata (Günther)

Leptodeira torquata Günther, Ann. Mag. Nat. Hist., ser. 3, vol. 5, Feb. 1860, p. 170, pl. 10, fig. A.

Leptodeira torquata torquata, (*part.*) Dunn, Proc. Nat. Acad. Sci., vol. 22, 1936, p. 694.

Comastes quincunciatus Jan, Iconographie Générale des Ophidiens, livr. 38, 1871, pl. 1, fig. 1 (Costa Rican specimen listed).

Knowledge of the species as a member of the Costa Rican fauna is based on two reports: One is that of Jan, *loc. cit.;* the other is that of a Costa Rican specimen in the Museo Nacional de Costa Rica.

The following characters distinguish the species: snout rounded, obtuse, rostral much broader than deep, the part visible above one fourth to one third its distance from frontal; frontal once and a third to once and a half as long as broad, as long as or a little longer than its distance from end of snout; loreal longer than deep; one preocular; a presubocular; two postoculars; temporals 1+2; eight (exceptionally seven) upper labials, fourth and fifth (third and fourth) entering eye; five infralabials touch first chinshields, which are shorter than posterior pair; scales in 21 rows; ventrals 169-174; anal divided; subcaudals 41-55.

Grayish or pale brown above, with a dorsal row, or two alternating series of dark brown spots separated by yellowish interspaces; sides with two or three alternating series of small dark brown spots; a large dark brown blotch on the nape preceded by a yellow collar; a dark brown streak on each side of the head passing through the eye; head speckled with dark brown; lower parts white. Total length 400 mm.; tail 60 mm.

Genus AMASTRIDIUM Cope

Amastridium Cope, Proc. Acad. Nat. Sci Philadelphia, 1860, p. 370.

Genotype: *Amastridium veliferum* Cope.

Only one species has been reported from Costa Rica.

Amastridium veliferum Cope

Amastridium veliferum Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 370 (type locality, "Cocuyas de Veraguas, N. Grenâda" = Coyucas, Panamá); Proc. Amer. Philos. Soc., vol. 23, 1886, p. 495; Amer. Nat., vol. 26, 1892, p. 481, and vol. 28, 1894, p. 840; Rept. U. S. Nat. Mus., 1898, pl. 24, fig. 13; Boulenger, Catalogue of the Snakes in the British Museum, ed. 2, vol. 2, 1894, p. 352; Dunn, Proc. U. S. Nat. Mus., vol. 65, 1924, p. 1-3 (Cariblanco, Costa Rica, etc.).

?Fleischmannia obscura Boettger, Katalog der Reptilien-Sammlung in Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt Am. Main. Teil II, (Schlangen) 1898, p. 69 (type locality, San José, Costa Rica).

?Phrydops melas Boulenger, Ann. Mag. Nat. Hist., ser. 7, vol. 15, May 1905, pp. 453-454 (Carriblanco, Costa Rica).

Phydrops melas (*sic*) Dunn, Copeia, 1391, no. 4, p. 163.

The characters by which this snake may be diagnosed are as follows: 12 maxillary teeth, the last one or two largest, not grooved; pupil round; no loreal; scales in 17 rows, smooth anteriorly, lightly keeled posteriorly, lacking pits, subcaudals divided.

Rostral scarcely visible above; internasals two-thirds times as long as the prefrontals; frontal longer than its distance from snout tip; one preocular; temporals, 1+2; seven supralabials, third and fourth enter eye; nine infralabials; ventrals 123-127; subcaudals 79-85; anal divided.

Above and below reddish brown, paler on center of ventrals; every fourth scale of the fifth row on each side pale, the adjacent scales on the fourth and sixth rows generally darker; top of head much lighter, varied anteriorly, palest behind eye and above labials; latter dark with a few light spots. Total length 355 mm.; tail, 120 mm.

I have examined a Harvard specimen (M. C. Z. No. 15319). The following characters are in evidence: scale formula 17-17-17; no loreal present; nasal single, the posterior end slightly higher than anterior; eye larger than its distance from rostral; one large squarish preocular, two postoculars; 7-7 supralabials, the third and fourth enter orbit; infralabials 9-9, 4 touch chinshields; fifth supralabials touches the parietal narrowly, the first temporal thus being separated from the postoculars; frontal narrow, twice as long as wide; temporals 1+2 (the two upper fused on one side); ventrals 136; anal divided; 48+ subcaudals.

Color of head and neck yellow-brown, the dark body color running forward to a point on the posterior edge of the parietals; fourth and seventh scale rows with darker lines made up of short dashlike marks; venter dark. A row of cream colored dots on the fifth scale row scarcely discernible.

Records of the snake for Costa Rica are: a specimen in the Museum of Comparative Zoology, Harvard College, from Cariblanco, Costa Rica; that of the type specimen of *Fleischmannia obscura* from San José, Costa Rica and the type of Boulenger's *Phrydops melas* from Cariblanco, Costa Rica.

Genus SPILOTES Wagler

Spilotes Wagler, Natürliches System der Amphibien, 1830, p. 179.

Genotype: *Coluber pullatus* Linnaeus.

Two forms of *Spilotes* occur in Costa Rica. These are usually considered as subspecies of *pullatus*. There is, however, doubt that *mexicanus* and *pullatus* intergrade where they meet. This group definitely is in need of a revision.

KEY TO FORMS OF COSTA RICAN SPILOTES

Yellow markings confined largely to the anterior part of body; latter part nearly uniform black; supralabials 7 (usually).....*pullatus pullatus*
Yellow markings of body extending to end of tail; supralabials 8.....*pullatus mexicanus*

Spilotes pullatus pullatus (Linnaeus)

Coluber pullatus Linnaeus, Museum Adolphi Friderici Regis, 1754, p. 35, pl. 20, fig. 3 (Asia, in error).
Spilotes pullatus Wagler, Natürliches System der Amphibien, 1830, p. 179.
Spilotes pullatus pullatus Dunn and Bailey, Bull. Mus. Comp. Zool. Harvard Coll., vol. 86, 1939, p. 18.

Two specimens of this large tree snake were captured, one (M. N. H. No. 25757) June 26, 1947, along the Reventazón River about 3 km. southwest of Turrialba, and one (M. N. H. No. 25756) July 19, near the same locality.

The head in each is banded with yellow but the yellow markings on body are greatly reduced, only traces being evident in a few small dashlike marks on a few scales. On the anterior part of the body, the ventrals are about half yellow; farther back the yellow is reduced so that only half of a ventral may be affected, and at ventral number 106 and 122 respectively the color ceases to have any yellow and from there to end of tail the color is uniform black. The ventral counts of the two specimens are 226, 221; subcaudals, 113 + and 74 + respectively.

The following characters also obtain: rostral scarcely visible above; internasals about one-fourth shorter than prefrontals; length of frontal slightly less than its distance to end of snout, about as wide as long, one-fourth shorter than parietals; length of latter scales less than their distance to internasals; loreal very small, about as long as high; preocular very large, minutely separated from frontal

scale; two postoculars; temporals, 1 + 1 + 1 (1 + 1); supralabials, 7-7, fourth and fifth entering eye; infralabials, 8-8, four touch chinshields, which are much larger than second pair. Scale rows keeled except outer, the formula 14-16-10; paired or single apical pits are present.

The tail of No. 25757 appears to be perfectly normal, the terminal scute being well developed. However its thickness at the tip suggests a well-repaired break. Moreover the number of subcaudals is 39 less than in the other specimen and that one has the extreme tip missing. No. 25756 has a more or less symmetrical pair of scales segmented from the inner parts of the parietals, that on the right being partially fused to the parent scale.

A specimen in the U. S. National Museum (No. 32650, Costa Rica) has the head largely black, with a neck band of yellow. A yellow stripe crossing head just behind the eyes is interrupted across the top of the head. There are yellow spots on rostral, nasals, prefrontals, internasals, supraoculars and frontal. The ventrals are black and yellow, the yellow predominating anteriorly, the latter half of body and tail uniform black. Ventrals 218, subcaudals 118.

Spilotes pullatus mexicanus (Laurenti)

Cerastes mexicanus Laurenti, Specimen Medicum exhibens Synopsin Reptilium emendatum. 1768, p. 82.

Spilotes pullatus mexicanus Amaral, Mem. Inst. Butantan, vol. 4, 1929, pp. 282-284 (Mexico to Nicaragua).

Spilotes pullatus auribundus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 13, 1861, p. 300.

Amaral in his review of the Genus *Spilotes* characterizes this presumed subspecies as having a loreal, eight supralabials, the fourth and fifth entering eye orbit; temporals 1 + 1 or 1 + 2; ventrals 204-222; subcaudals 115-138; scale rows 18 (19) around middle of body.

The presence in Costa Rica of specimens of this subspecies, if indeed it is related subspecifically to *pullatus*, is attested by certain specimens in the U. S. National Museum: Nos. 37724, 37725, and 37726, Esparta, Costa Rica.

No. 37725 has the supralabials 8-8; scale rows 16-16-16-12; ventrals 220; subcaudals 134. The yellow banding of the head and body continues on to the tail, the black interspaces are of about 7 scale lengths, the yellow 3 or 4 scale lengths.

No. 37726 is a young specimen with the body coloring forming strongly-defined body bands, and in appearance is very different from that of the adult.

Genus THALEROPHIS Oliver

Thalerophis Oliver, Copeia, 1947, p. 64.

Genotype: *Coluber richardi* Bory St. Vincent.

The group of tree snakes long known under the genus *Leptophis* are here treated under the genus *Thalerophis* since the name *Leptophis* is not available. The species belonging in the genus have recently been reviewed by Dr. James Oliver * and several nominal species formerly believed to occur in Costa Rica are reduced to synonymy. Thus *aeruginosus* Cope, *bilineata* Günther and *saturatus* Cope are regarded as synonyms of *T. depressirostris* Cope; and *ultramarinus* is regarded as a synonym of *T. richardi occidentalis* Günther.

The following four species are recognized as occuring in Costa Rica: *depressirostris, mexicanus mexicanus, nebulosus, richardi occidentalis,* and these may be differentiated on the basis of the following synopsis.

SYNOPSIS OF COSTA RICAN SPECIES OF THALEROPHIS

1. Loreal normally present 2
   Loreal normally absent 3
2. A strong black stripe from snout through eye and onto side of body; body scale rows keeled except outer; ventrals: in males 148-169, average about 157; in females 154-174, average about 161; maxillary teeth 20-25 (average 21), last two enlarged ..... *mexicanus mexicanus*
   No black stripe beginning on snout; a short stripe beginning behind eye terminates back of the jaw angle; two paravertebral scale rows keeled, others smooth; ventrals 144-158; nine supralabials; maxillary teeth 33-36, the last three or four enlarged ..... *depressirostris*
3. A dark stripe on lores continued back of eye to jaw angle; a greenish blue, or blue dorsolateral stripe on third and fourth scale rows (or third, fourth and fifth); ventrals: males 150-160, female 158; maxillary teeth 28-29, the last three enlarged ..... *nebulosus*
   No dark mark in front of eye; top of head dark blue or greenish blue, which color extends over the body; ventrals: males 158-177, females 161-181; maxillary teeth 18-25 (average about 21); supralabials 8 or 9 ..... *richardi occidentalis*

Thalerophis mexicanus mexicanus (Duméril, Bibron and Duméril)

Leptophis mexicanus Duméril, Bibron and Duméril, Erpétologie Générale . . . , vol. 7, pt. 1, p. 536 (type locality, Mexico.)

Thalerophis mexicanus mexicanus Oliver, Bull. Amer. Mus. Nat. Hist., 1948, pp. 211-217.

Rostral broader than high barely visible from above; internasals usually a little shorter than the prefrontals; frontal once and one third to once and two thirds as long as broad, as long as its distance from the end of the snout, shorter than parietals; nasal elongate, at least partially divided; loreal present, at least twice as long as high; one preocular, very large but not reaching frontal; two postoculars;

* The Relationships and Zoogeography of the Genus Thalerophis. Oliver, Bull. Amer. Mus. Nat. Hist., vol. 92, 1948, pp. 161-280.

temporals 1+2; eight supralabials, fourth and fifth entering eye; usually 10 infralabials. Scales in 15-15-11 rows, keeled save on outer rows.

Green or dark greenish blue above; a narrow black stripe along the side of head passing through eye, continues along the side of the body and tail, varying somewhat in width and intensity. When outer epidermis is present the color on sides and dorsum is brownish to bronze-brown; when it is removed the general color is greenish blue to greenish or olive brown; belly white.

This species has been reported from San José; other specimens are reported, labeled only "Costa Rica" without definite locality.

Thalerophis depressirostris (Cope)

Philothamnus depressirostris Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 557 (Cocuyas de Veraguas, Colombia).

Diplotropis bilineata Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1872, p. 24, pl. 6, fig. B (type locality, Costa Rica).

Leptophis aeruginosus Cope, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1876, p. 132 (type locality, Costa Rica).

Leptophis saturatus Cope, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1876 (1875) p. 133 (type locality, Sipurio, Costa Rica).

Thalerophis depressirostris Oliver, Bull. Amer. Mus. Nat. Hist., vol. 92, 1948, pp. 203-207, figs. 1G, 4, 8, and plate 16 (figure on right).

This species is represented by a single specimen, M. N. H. No. 25704, collected by Prof. Marco Tullio Pacheco, and presented to me. It was found near Peralta at an elevation of 300 meters. The following scale characteristics are present:

Rostral visible above as a small triangle; internasals as long as prefrontals; frontal more than one fourth longer than wide, its length about equal to its distance from end of snout; length of parietal about equal to its distance from internasal; nasal nearly equally divided; loreal twice as long as wide; preocular large, well separated from frontal; two postoculars; temporals 1+2; supralabials 8-9, the fifth and sixth (fourth and fifth) bordering eye; infralabials 10-10, five bordering the chinshields; scale formula, 17-15-11; the scales smooth except the two rows bordering the single median row; indistinct apical pits on some scales; ventrals 147; tip of tail lost; anal divided.

Thalerophis nebulosus (Oliver)

Leptophis nebulosus Oliver, Occ. Papers Mus. Zool., Univ. Michigan, no. 462, 1942, p. 12, fig. 4 (second figure p. 192) (type locality, Cariblanco, Costa Rica).

Loreal absent; a single preocular, touching or narrowly missing contact with frontal; frontal large, length approximately equal to that of interparietal suture; temporals 1 + 2; eye equal to its distance

from anterior border of nostril; eight supralabials normally; infralabials ten (usually); scale formula, 15-15-11, keeled save on outer row. Ventrals 150-160; subcaudals 145-151; anal plate divided.

Top of head bluish green; a narrow black stripe beginning on upper edge of first or second labial passing back through eye and for a short distance on the side of the body. Body color cream-white on outer scale rows, the next three rows bright blue; scales on head, below the black stripe, white or cream; venter and chin cream.

Only the type is known from Costa Rica.

Thalerophis richardi occidentalis (Günther)

Ahaetulla occidentalis Günther, Proc. Zool. Soc. London, 1859, p. 412 (type locality, Guayaquil and western Equador).

Thalerophis richardi occidentalis Oliver, Bull. Amer. Mus. Nat. Hist., vol. 92, 1948, pp. 241-245.

Leptophis ultramarinus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 46, 1894, p. 204 (type locality, Pozo Azul, Costa Rica).

Loreal shield normally absent; normally one preocular in contact with the frontal; two postoculars; supralabials eight or nine, frontal large; temporals 1+2; infralabials usually ten; scale rows 15-15-11, all keeled save outer one or two rows, and the keels may be lacking from the median row; ventrals: males 152-177, females 161-182; subcaudals: males 153-189, females 161-175.

Color of head dark blue to greenish blue, this color extending onto body and tail, extending even to outer edges of ventrals; infralabials, chin and venter pale greenish blue to yellowish white.

Reported from Barranca, Buenos Ayres, Colorado Bar, Limón, Pozo Azul, and Siquirres.

I have examined an uncatalogued specimen of this species in the U. S. National Museum collected 2 mi. SE of Turrialba, Costa Rica. It has the following characters: loreal absent; supralabials 9-9, the fifth and sixth entering orbit; one preocular, two postoculars; 10-11 infralabials, five touching the first chinshields which are shorter than second pair; three labials touch prefrontals; eye large, equal to its distance to front edge of nostril; frontal equal to its distance to snout tip; ventrals 172; subcaudals 173+; scales 15-15-11, the scale rows bordering the median row strongly keeled as is the adjoining row; outer scales smooth but each with a median black line simulating a keel.

Genus DRYADOPHIS Stuart

Dryadophis Stuart, Copeia, No. 1, 1939, p. 55.

Genotype: *Coluber boddaerti* Sentzen.

Only a single species is known to occur in Costa Rica.

Dryadophis melanolomus alternatus (Bocourt)

Coryphodon alternatus Bocourt, Bull. Soc. Philom., ser. 7, vol. 8, 1884, pp. 133-142, and Etudes sur les Reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 11, 1888, pl. 45, fig. 3a-e (not mentioned in text).

Drymobius alternatus Cope, Bull. U. S. Nat. Mus., no. 32, 1887, p. 70.

Dryadophis melanolomus alternatus Stuart, Misc. Publ. Mus. Zool., Univ. Michigan, no. 49, Mar. 17, 1941, pp. 81-86.

The specimen described by Bocourt, or at least the specimen figured by Bocourt, for *Dryadophis alternatus* is strikingly different from the species considered under this name by Stuart in his revision of the genus, *loc. cit.* Bocourt's figure is of a snake with well-defined quadrangular dorsal blotches alternating with a lateral series of somewhat smaller quadrangular blotches. Under this name Stuart treats of a snake that is uniformly colored. It is presumed that the young have a pattern differing from adults, and the specimen depicted by Bocourt was a juvenile.

Of the five specimens at hand, R. C. T. Nos. 417 and 656 are from Turrialba, elev. about 1900 ft.; R. C. T. No. 968 from San Isidro El General, elev. about 2000 ft.; and R. C. T. Nos. 1437 and 1438 from Los Diamantes, about 2 kilometers south of Guápiles, at an elevation of about 800 feet.

Specimens from Los Diamantes were olive in life; the ventral color being immaculate pinkish. The sides of the ventrals are subangular; however there is no decided keel present. The outer edges of the ventrals were gray-olive in life. With a loss of the outer epidermis the specimens now are uniform gray-blue. When placed under water, the scales appear slightly darker on their edges. The pink color is still present on the ventrals. Neither of the two specimens displays any transverse banding or longitudinal lineation. One of these has an undivided anal scale.

The two specimens, Nos. 417, 656 differ somewhat. In life they were olive above without markings, the venter with a yellow wash and the throat and chin bluish gray with small yellow spots. All trace of olive and yellow has now disappeared, leaving the dorsum dull grayish blue, the venter dirty white with the edges of the ventrals clouded with gray. The chin spots are cream-white. An indistinct median zigzag line is present under the tail.

The small specimen from San Isidro El General when first examined was olive in color but with some slight indication of darker crossbars on the anterior part of the body, and a faint indication of a light lateral stripe. In the preserved specimen with outer epidermis removed, no trace of the crossbands remains; but submerged in water there are visible certain darker and lighter stripes; a dim light stripe is present on the fourth and slightly on the fifth scale row. The third scale row is bordered by darker color, tending to form a dark longitudinal line. The first and second scale rows are a little lighter than surrounding scales so that a dim lighter stripe is evident here. The lower edges of the first row and outer edges of the ventrals are darker than the remainder of the scale and another dim, dark line is evident. Ventrals angular, the outer, turned-up edges blue-gray, the ventral portion being finely mottled with light gray. On the angular keel a light line is more or less evident.

DATA ON DRYADOPHIS MELANOLOMUS ALTERNATUS (Bocourt)

No.	Sex	Ventrals	Subcaudals	Supralabials	Labials enter eye	Infralabials
1438	♂	182	97	9–9	4, 5, 6	10–10
1437	♂	180	96	9–9	4, 5, 6	10–10
417	♂	175	91	9–9	4, 5, 6	11–11
656	♂	179	101	9–9	4, 5, 6	10–11
968	♂	176	108	8–9	4, 5, 6 (3, 4, 5)	9–10

DATA ON DRYADOPHIS MELANOLOMUS ALTERNATUS (Bocourt) (concluded)

No.	Labials touch chinshields	Temporals	Scale rows	Anal	Ventrals keeled	Ventrals color
1438	5	2 + 2	17–17–15	2	slightly	reddish
1437	5	2 + 2	17–17–15	1	slightly	reddish
417	5	2 + 2	17–17–15	2	not	gray
656	5	2 + 2	17–17–15	2	not	gray
968	5	2 + 2	17–17–15	2	not	gray

Genus DRYMOBIUS Fitzinger

Drymobius Fitzinger, Systema Reptilium, 1843, p. 26.

Genotype: *Herpetodryas margaritiferus* Schlegel. Four species are recognized in Costa Rica.

KEY TO SPECIES OF DRYMOBIUS IN COSTA RICA

1. Body with a series of brown saddlelike blotches, alternating with smaller lateral spots; ventrals 146-152; subcaudals 88-91 ..... *rhombifer*
   Body not marked with blotches, but generally black or green 2
2. Body black, each scale with a dashlike green or yellow-green mark; ventrals 146-149; subcaudals 109-117 ..... *margaritiferus margaritiferus*
   Body green; belly more or less yellowish in life 3
3. Body green, the color encroaching on ventrals; keels of three median rows black ..... *melanotropis*
   Body green, the keels of the median rows not black ..... *chloroticus*

Drymobius margaritiferus margaritiferus (Schlegel)

Herpetodryas margaritiferus Schlegel, Essai sur la physionomie des serpens, vol. 2, 1837, p. 184.
Drymobius margaritiferus [*margaritiferus*] Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 12, 1890, pp. 716-718, pl. 49, fig. 2.

This common, widespread species is represented by three specimens. M.N.H. No. 25701, an adult male, was captured as it attempted to cross the road in front of our car, five kilometers southwest of Turrialba. A young specimen (R.C.T. No. 205) was taken three kilometers west of Turrialba. A third specimen (M.N.H. No. 25165) in the University collection was obtained five kilometers southwest of Turrialba in 1947 by Mr. Howard Westman.

The characteristics of the young (No. 205) follow: a greenish white longitudinal mark on the frontal; a pair of greenish white lines curving behind last labial and extending to parietal; following this a large series of vertical greenish white and black lines running up on the sides to near the mid-line, a line occasionally meeting its fellow, but more commonly alternating with it. These lines gradually more indistinct on latter half of body where light and dark colors tend to form indefinite longitudinal lines, the most distinct being the greenish white line on the two outer scale rows that terminate at anus; ends of ventrals blackish; the free edge of the scales may be blackish for a greater or lesser distance, rarely crossing ventral; supralabials with black sutures; infralabials and chin greenish cream.

In the two adults the color is blackish, each scale with a small dashlike greenish or greenish-white spot near the center, the greenish spots becoming regularly larger on lower (outer) rows; black on ventrals often across the posterior part of scale; spots on No. 26165 slightly larger and more distinct than those on No. 25701.

I have examined four Costa Rican specimens in the U. S. National Museum; three of these have a ventral scale count of 148; one has 147.

DATA ON DRYMOBIUS MARGARITIFERUS MARGARITIFERUS

No.	Sex or age	Supralabials	Infralabials	Ventrals	Subcaudals	Scale formula
205	yg.	9– 9	11–10	148	...	17–17–15
25701	♂	9– 9	11–11	146	109	17–17–15
25165	♂	9–10	10–11	149	117	17–17–15

Drymobius rhombifer (Günther)

Coryphodon rhombifer Günther, Proc. Zool. Soc. London, 1860, p. 236 (type locality, Esmeraldas, Ecuador).
Drymobius rhombifer Peters, Monatsb. Akad. Wiss. Berlin, 1879, p. 777.

Two specimens of this species (M.N.H. Nos. 25734, 25744) were obtained at Turrialba. The following characters are present in the

species; rostral about one fifth wider than high, the area visible above, small, its length about one third the length of internasals; length of latter three fourths of prefrontals, which are one fifth wider than long; frontal one fourth longer than wide, its length equal to its distance from tip of snout or slightly less; parietals short, their width two thirds of their length; nasal divided; posterior part higher and shorter than anterior; loreal a little longer than high; one preocular not reaching frontal; two postoculars; temporals 2 + 2; supralabials 9-9, the fourth, fifth and sixth entering eye; infralabials 9-9, five touching first chinshields, which are a little shorter than second pair; scale formula: 17-17-15, keeled lightly; ventrals 152; subcaudals 88; anal divided.

A series of dark-brown, saddlelike blotches present reaching to ventrals where they border a black ventral spot; between these latter are small (often) triangular spots touching two or three ventral black spots, the apex reaching as high as fifth lateral scale row.

Belly with an irregular series of black blotches along the outer part of ventrals rarely more than one scale wide; between these on middle of venter small scattered black spots. On the brown blotches, each scale edged with black. Chin and throat immaculate, lower part of supralabials nearly white.

The smaller specimen is quite similar. The ventrals are about 146 (injured), the subcaudals 91. The dorsal head scales have deep black spots or punctations. In both specimens there is a somewhat lighter area on each parietal.

This is a South American species that has entered Costa Rica. The greater part of the range is in Colombia, Ecuador and Perú.

Drymobius chloroticus (Cope)

Dendrophidium chloroticum Cope, Proc. Amer. Philos. Soc., vol. 23, 1886, p. 278 (Guatemala).
Drymobius chloroticus Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, pp. 16-17.

Two specimens were collected at Isla Bonita, one, R.C.T. No. 702, an adult female, and R.C.T. No. 654, a young male.

Data taken from the larger, female specimen follows: part of rostral visible above less than half length of internasals; latter scales only a little shorter than the prefrontals; frontal one fourth longer than wide, its length equal to its distance to end of snout or slightly more; length of parietal equal to its distance from internasal; nasal divided, the anterior part the larger; loreal nearly twice as wide as high; one preocular, very large, widely separated from frontal; two postoculars; temporals 2 + 2; supralabials, 9-9, the fourth, fifth and

sixth border eye; infralabials, 10-11, the first five touching first chinshields, which are about three fifths the length of second pair; ventrals, 186; anal divided; subcaudals, 121. Scales keeled, the formula, 17-17-15 with paired pits. Maxillary teeth about 31, increasing a little in length and size posteriorly.

The second specimen, No. 654, has the infralabials 9-9; the ventrals 186; the subcaudals 100, the tail seemingly complete.

In preservative the specimens are uniform bluish gray above, the belly greenish yellow, each ventral and subcaudal bordered by blackish. In life, olive on dorsal and lateral regions, greenish yellow on venter; upper labials (except upper edges) and chin, cream yellow.

Drymobius melanotropis (Cope)

Dendrophidium melanotropis Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 134, pl. 26, fig. 1 (type locality, Costa Rica).

Drymobius melanotropis Gaige, Hartweg and Stuart, Occ. Papers Mus. Zool. Univ. Michigan, no. 357, 1937, p. 13 (Río Siquia Nicaragua).

Scales in 17 rows, with apical pits present, all keeled except the two outer rows, the keels on the paravertebral rows strongest; rostral broader than deep; frontal bell-shaped, wide in front, contracted behind, as long as the parietals; loreal much longer than high; one preocular, one subocular; two postoculars; temporals 2 + 2; nine supralabials, the fourth, fifth and sixth bordering orbit; ventrals 152-163, not angulate; subcaudals 91-96; anal divided.

Green above and on sides, the color occupying the outer fourth of the ventral scales. Yellow on venter; keels of three median rows black.

Genus DENDROPHIDION Fitzinger

Dendrophidion Fitzinger, Systema Reptilium, 1843, p. 26.

Genotype: *Herpetodryas dendrophis* Schegel.

Two species are known from Costa Rica.

KEY TO THE COSTA RICAN SPECIES OF DENDROPHIDION

Ventrals 150-175; subcaudals 113-155; olive brown, uniform or with blackish cross-bands enclosing rounded whitish spots, or with whitish black-edged cross-bands; upper lip whitish or yellow ..... *dendrophis*

Ventrals 183; subcaudals 127; color brown, without markings; below yellow; upper lip partly yellow ..... *paucicarinatus*

Dendrophidion paucicarinatus (Cope)

Drymobius paucicarinatus Cope, Proc. Acad. Nat Sci. Philadelphia, 1894, pp. 202-203 (type locality, La Candelaria, Costa Rica).

Scales in 17 rows, five median rows faintly keeled, others smooth; one preocular, not reaching frontal; two postoculars; loreal sub-

quadrate, longer than high; temporals 1 + 2; four and one-half scales bordering each parietal; supralabials nine, fourth, fifth and sixth border orbit, the eighth and ninth longer than high; eye large, its diameter equaling length of muzzle from its border to the nostril, and equaling a little more than half interocular distance; frontal wide in front, contracting rapidly posteriorly, the lateral borders very little concave; ten infralabials; anterior chinshields shorter than posterior; ventrals 183; subcaudals 127; anal divided.

Color above brown without markings, below yellow; ends of ventrals and a narrow transverse line near base of ventrals lead colored; much of upper lip yellow.

Dendrophidion dendrophis (Schlegel)

Herpetodryas dendrophis Schlegel, Essai sur la physionomie des Serpens, vol. 2, 1837, p. 196. (Also in another work having the same title and date, this name and a synopsis appears on p. 153 with the following data, "Herpetodryas dendrophis. 15 Rangées d'écailles carénées et lancéolées. Dessous de la queue aplati; ventre convexe. 140 + 196? Dessus brun-olivâtre, marqué de nombreuses bandes étroites transverales foncées, que renferment des taches claires. De Cayenne.")

Dendrophidium dendrophis Cope, Proc. Amer. Philos. Soc., vol. 23, 1886, p. 278.

Scales in 17 rows with apical pits. Maxillary teeth in a continuous series 33-50 subequal. Normally supralabials nine, the fourth, fifth and sixth bordering orbit; one preocular, two postoculars; temporals normally 2 + 2, but variable; ventrals 150-175; subcaudals 113-155.

"Olive-brown above, uniform or with blackish cross-bands enclosing rounded whitish spots, or with whitish black-edged cross-bands; upper lip whitish; ventrals and subcaudals olive on the sides, whitish, uniform or dotted or edged with olive in the middle."

Genus PSEUSTES Fitzinger

Pseustes Fitzinger, Systema Reptilium, 1843, p. 27.

Genotype: *Dipsas dieperinkii* Schlegel [= *Pseustes sulphureus sulphureus* (Wagler)].

One species is known in Costa Rica.

Pseustes poecilonotus chrysobronchus (Cope)

Spilotes chrysobronchus Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 136, pl. 28, figs. 11a, 11b (head only); U. S. Nat. Mus. Bull. no. 32, 1887, p. 71; Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique, et dans l'Amérique Centrale, livr. 11, 1888, pp. 695-696, pl. 48, figs. 3a, 3b (after Cope) (data from Cope); Günther, Biologia Centrali-Americana; Reptilia and Batrachia, Feb. 1894, p. 119.

Phrynonax chrysobronchus Boulenger, Catalogue of the Snakes in the British Museum (Natural History), vol. 2, p. 22 (data from Cope).

Phrynonax poecilonotus chrysobronchus Amaral, Mem. Inst. Butantan, T. 4, 1929, p. 156 (Costa Rica).

Cope has compared this form with *Spilotes fasciatus* Peters but decides the two are distinct. Boulenger likewise regards the two

as distinct. Günther however suggests that the two forms may be identical.

The single specimen in the collection was obtained by Mr. Charles R. Camp, 5 km. SE of Turrialba, elev. 1950 ft., Province Cartago, Costa Rica.

Head flattened, distinct from neck; rostral a little broader than deep; internasals about two thirds the area of prefrontals; latter scales border loreal but are separated from the supraocular; frontal as long as its distance from the tip of snout, about one fifth longer than wide; parietals short, about as wide as long, equally as long as frontal.

Nasal single, pierced by nostril, but a groove from nostril, to labial suggests a partial division; loreal small, a little longer than wide; one large preocular reaching frontal narrowly, and bordering two labials below; supraocular large, longer than wide; two postoculars; temporals $\frac{2}{1}+2$; eight upper labials, the fourth, fifth, and sixth bordering eye, eighth greatly elongated; 12 lower labials, seven touching first pair of chinshields; these about one fifth shorter than second pair.

Scale formula, 21-25-17-15; scales with paired apical pits, and tending to form diagonal rows on the sides; four median dorsal rows with indistinct keels. Ventrals 211; subcaudals 132; anal single; snout to vent 1115 mm.; tail, 436 mm.; total length 1551 mm.; width of head 43 mm.; snout to rictis oris, 40 mm.

Scales pinkish fawn, each bordered with brown or black. Sometimes entire scale is bordered, sometimes only a part, the border varying in width, and thus developing a more or less distinct pattern of indistinct, dark, diagonal blotches joining medially; supralabials, infralabials, chin, throat and anterior one fourth of venter yellowish white, there being a few black dots on outer edge of ventrals, which more posteriorly encroach on the middle of ventrals until they form continuous transverse black borders on each ventral, and still farther back tend to cover the entire scale. Top and side of head dark.

Variation: The total ventral-subcaudal count for one of the cotypes is 337 (ventrals, 220, subcaudals, 117). In the described specimen the total is 343 (ventrals 211, subcaudals 132). This specimen is a female; I presume that the cotype specimen is also a female. The tail in the cotype is proportionally shorter and the body longer (1670 mm., to 422 mm.) than in this specimen (1551 mm., to 436 mm.).

There are certain scale differences between the cotype and the Turrialba specimen. Thus in the former there are 8 supralabials (seven with one partially divided on one side, the third, fourth, and fifth labials bordering orbit), while in the latter there are eight on both sides, the fourth, fifth and sixth bordering orbit. The cotype has 1-2 preoculars not reaching the frontal; in this they are 1-1 touching frontal on both sides.

Pseustes shropshirei (Barbour and Amaral)

Phrynonax shropshirei Barbour and Amaral, Occ. Papers Boston Soc. Nat. Hist., vol. 5, Sept. 12, 1924, p. 131 (vicinity of Gatun, Canal Zone of Panamá).

Phrynonax poecilonotus shropshirei Amaral, Mem. Inst. Butantan, Tomo 4, 1929, pp. 317-318, fig. 4.

This form was originally characterized as follows:

Rostral slightly wider than deep (8:7), just visible above; internasals two thirds as long as the prefrontals (4:6); frontal as long as wide, as long as its distance from end of snout, a little shorter than parietals (10:12); loreal longer than deep; one preocular touching frontal; 2 postoculars; temporals 2+; seven or eight upper labials, fourth and fifth or fourth, fifth and sixth entering orbit, the eighth much the longest; seven to eight lower labials border first chinshields which are much shorter than the posterior (10:17); scales in 25 rows (21-24-25-24-21-19-17-15), the median rows feebly keeled; ventrals 211, obtusely angulate laterally; anal single; subcaudals 116+, divided.

Blackish brown above, irregularly barred with yellow; dorsal scales either entirely black or black-edged; head dark brown above, a wide border on lip yellow, the labials blackish on their upper edges; lower surfaces yellowish gradually changing to pure black posteriorly, including tail; anterior ventrals with dark outer edges. Total length 1630 mm.; tail 430 mm. (Data from type description.)

A specimen, R. C. T. 682 ♀, Turrialba, is referred to this species. It agrees in all essential detail. The head and neck, for 6-8 inches, are coal black save outer two scale rows which have some white; beyond this the pattern of transverse marks consisting of black-edged yellowish scales continues to tail; ventral surface of posterior part of body and tail nearly uniform black; ventrals 214; subcaudals 116+ (tip missing). Scale rows 21-23-25-13(15); supralabials 8-8; infralabials 11-11, seven touching the first chinshield. Total length 1714 mm.; tail 469 + mm. (tip missing).

Since the specimen of *poecilonotus chrysobronchus* was obtained at this locality (within three miles), I would suspect that the two are worthy of specific rank.

Genus CHIRONIUS Fitzinger

Chironius Fitzinger, Neue Classification der Reptilien . . . , 1826, p. 31.

Genotype: *Coluber carinatus* Linnaeus.

Three species of this genus occur in Costa Rica. They may be distinguished by the following key.

KEY TO THE COSTA RICAN SPECIES OF CHIRONIUS

1. Dorsal scales smooth; three labials enter orbit; scales 10-8 ..... *melas*
   Dorsal scales keeled; two or three labials enter orbit 2
2. Scale formula, 12-8; two labials enter orbit; (rarely not keeled) ..... *carinatus*
   Scale formula, 10-8, three labials enter orbit ..... *grandisquamis*

Chironius carinatus (Linnaeus)

Coluber carinatus Linnaeus, Museum Adolphi Friderici Regis, I, 1754, p. 31; and Systema Naturae, vol. 1, 1766, p. 384.

Chironius carinatus Fitzinger, Neue Classification der Reptilien . . . , 1826, p. 60; Dunn and Bailey, Bull. Mus. Comp. Zool. Harvard Coll., vol. 86, 1939, p. 18 (Cana, Panamá).

Specimens of *Chironius carinatus* may be identified as to genus by the large scales in even number of rows, varying from 12 rows anteriorly to 8 on the posterior half of the body. A second easily observed character is the high dorsal ridge on the body, flat on top, covered by two scale rows, each scale bearing a sharp keel. Anteriorly the scales tend to form diagonal rows, but posteriorly this is not the case.

Our collections contain two specimens caught along the Reventazón River on the farm of the Inter-American Institute of Agriculture, two kilometers southwest of Turrialba, and one at Isla Bonita on Volcán Poás.

The following scale characters obtain in M. N. H. No. 25745, Turrialba: rostral visible above; frontal longer than its distance from the snout, one-fourth longer than wide; parietals short, about one-fourth times longer than wide, their length equal to that of the frontal or slightly longer; nasal divided, the anterior part larger; loreal low, much longer than high; one very large supraocular not reaching the frontal; two postoculars; temporals 1+2; supralabials 9-9, the fifth and sixth entering orbit; infralabials 11-11, five touching anterior chinshields, which are about same length as posterior pair; scale rows 12-12-8; ventrals 147, subcaudals 133.

A specimen in the U. S. National Museum collected by George K. Cherrie in "Costa Rica" has 153 ventrals and 136+ subcaudals; scale rows 12-12-8, the keels not strongly evident (the outer epidermis being absent); supralabials 9-9; the fourth, fifth and sixth border orbit (the fourth barely touches); infralabials 10-11, the six anterior touching the first chinshields. Above uniform olive green, the belly

lighter olive; chin, labials and throat, for a short distance, yellowish.

Another specimen (U. S. N. M. No. 14063) has the median scale rows very strongly keeled; scale formula, 12-12-8; ventrals 145, subcaudals 123; anal divided.

A third Costa Rican specimen is uniform olive-green and has the median rows keeled; ventrals 146, subcaudals 138. I failed to record the museum number of this specimen.

Chironius grandisquamis (Peters)

Spilotes grandisquamis Peters, Monatsb. Akad. Wiss. Berlin, 1868, p. 451 (type locality, Costa Rica).

Herpetodryas grandisquamis Cope, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1876 (1875), p. 135; Bocourt, Etudes sur les Reptiles; Mission Scientifique au Mexique et dans l'Amérique Centrale, livr. 12, 1890, p. 732, pl. 43, fig. 5.

One very large specimen (No. 703) was obtained at Isla Bonita. In preservative the specimen is coal black above, especially on the latter two thirds of the body and tail (probably olive in life). The lower part of the supralabials, the chin and throat are whitish (probably yellowish in life). The light color of the ventrals begins to be clouded at the 54th ventral, and at the 80th the ventrals have become entirely dark.

This snake may be differentiated readily from *Chironius carinatus* by the scale formula 10-8 (instead of 12-8), and by the fact that three labials, the fourth, fifth and sixth (instead of the fifth and sixth only) enter the orbit and the second pair of chinshields are nearly a half longer than the first pair (instead of being equal or only slightly larger). The two median scale rows are elevated and strongly keeled, and the other scale rows are rather lightly keeled, except the outer which is smooth.

Some of the scale characters of this specimen are: rostral visible above as a narrow line; internasals very large, their length only a little less than that of the prefrontals; frontal distinctly shorter than its distance to the tip of the snout, and at least one-third shorter than the short parietals; length of latter less than their distance from the internasals; nasal not completely divided; loreal not noticeably longer than high; one very large preocular not reaching frontal; two postoculars; temporals, 2-2; supralabials, 9-9, fourth to sixth bordering orbit; infralabials 10-10, five touching the anterior chinshields; ventrals 161; subcaudals 127 +; anal divided. Single pits are present on a few scales on anterior part of body.

Length 2164 + mm., of which the tail is 750 + mm. (probably not more than one or two centimeters missing). The stomach contained a large specimen of *Eleutherodactylus* partially digested.

A specimen in the U. S. National Museum from "Costa Rica" (No. 14061) has 162 ventrals, 128 subcaudals. The yellow color of venter extends to the 75th ventral.

Chironius melas (Cope)

Herpetodryas melas Cope, Proc. Amer. Philos. Soc., vol. 23, 1886, p. 278 (Nicaragua).
Chironius fuscus (part.) Amaral, Mem. Inst. Butantan, Tomo 4, 1929, p. 161 (35).

The characters of this species are as follows:

Scales in ten longitudinal series, all smooth, those of the median row larger than those of the lateral rows and rather smaller than the parietal scales; parietals rather short and wide, openly emarginate behind; nine supralabials, all longer than high, the fourth, fifth and sixth entering orbit; nasals well developed; loreal square; one preocular, two postoculars; temporals 1 + 1 + 1; muzzle rather short; eye large, its diameter equal to its distance from the nostril; infralabials ten, five touching first chinshield; second pair of chinshields longer than first; ventrals 158; anal divided; subcaudals 139. Total length 1210 mm.; tail 470 mm.

Shining black except on the supralabials and anterior or half of venter which are cream; the edges of light ventrals are black; here and there black scales have white edges, especially back of jaw angle, (data from type specimen).

I have examined a Costa Rican specimen classified as this species in the U. S. National Museum collected by C. N. Riotte. It agrees with the type in the characters of squamation save that the anal is single. Ventrals 163; subcaudals 141. The sides of the frontal slightly concave; frontal 1/4 to 1/3 longer than its distance from snout; parietals short, 1/6 longer than the frontal; head dark, the labials cream; snout somewhat lighter than back of head; anteriorly a series of transverse lines formed of brown dots; there are 20 of these in a distance of 5 inches; farther back the dots are larger, the interspaces narrower. The specimen is discolored to the extent that one cannot be certain of the posterior coloration. It may be that this specimen is incorrectly referred here. The anal plate may, however, represent an anomaly.

Genus ELAPHE Fitzinger

Elaphe Fitzinger in Wagler, Descriptiones et icones amphibiorum, pt. 3, 1833, text to, and pl. 27.

Genotype: *Elaphe parreysii = quatuorlineata.*

Two species occur in Costa Rica. These may be distinguished by the following key:

KEY TO THE COSTA RICAN SPECIES OF ELAPHE

Scales 31-35-21; young pale brown with one or two dorsal series of about 50 dark brown black-edged spots, alternating with smaller lateral spots. Adults uniform brown, below yellowish ..... *triaspis*

Scales 27-33-21; a series of large red or chestnut brown spots on each side which may alternate or join to form a zigzag band; below, yellowish, usually with brown spots ..... *flavirufa flavirufa*

Elaphe triaspis (Cope)

Coluber triaspis Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 18, 1866, p. 128 (type locality, Belize = British Honduras).

Elaphe triaspis Amaral, Mem. Inst. Butantan, Tome 4, 1929, p. 158 (33); Smith, Copeia, No. 3, 1941, p. 136.

Rostral about as wide as high, visible from above; internasals much shorter than prefrontals; frontal one and one half times as long as wide, its length equal to its distance from end of snout; loreal present; preocular one, large, reaching frontal or not; two postoculars; temporals 2 + 3, 3 + 3, or 3 + 4; supralabials eight or nine, normally eight, the fourth and fifth bordering eye; infralabials 13, four or five bordering first chinshields, which equal the posterior pair in length; scale formula, 31-35-21, the posterior rows faintly keeled. Ventrals 243-282; anal divided; subcaudals 73-119. Eye relatively small.

Young pale brown above with one or two dorsal series of about 51 large dark brown black-edged spots and an alternating lateral series of smaller spots; two or three dark brown stripes on occiput and neck; two curved dark stripes across snout. Adult uniform brown, lower parts uniform yellowish. Total length more than one meter.

According to Smith, (*loc. cit.*) a specimen from Costa Rica (U.S.N.M. No. 9777), is one of the paratypes of *Coluber mutabilis* Cope. The specimen has 259 ventrals; subcaudals 114; scale formula 29-31-25-21, with low keels on the scales of the posterior part of the body; temporals 4 + 5; supralabials 8-8. The specimen measures 1080 mm. in total length; the tail, 247 mm.

Elaphe flavirufa flavirufa (Cope)

Coluber flavirufus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 18, 1866 (1867), p. 319 (type locality, Yucatán).

Elaphe flavirufa Viquez, Nuestros Animales venenosas, 1941, p. 65 (Costa Rica).

Elaphe flavirufa flavirufa Smith, Copeia, 1941, no. 3, p. 132, fig. 2.

Rostral broader than deep, just visible above; internasals shorter than prefrontals, frontal one and one half to one and one third times as wide as long, nearly equal to its distance from snout tip, shorter than parietals; loreal present, longer than high; preocular

one, large (may be divided); postoculars two; temporals 2 + 3, 3 + 3, or 3 + 4; eight or nine supralabials, fourth and fifth, or sometimes also sixth, enter orbit; infralabials, 13-13, four or five touching the anterior chinshields; scale formula 27-33-21; the dorsals faintly keeled; ventrals 252-266; subcaudals 102-119; anal divided.

Yellowish or pale brown above, with a dorsal series of about 51 reddish or chestnut-brown black-edged transverse spots which may alternate or be confluent into a zigzag band; a lateral series of spots alternating with the larger dorsal series; two curved bands across snout, and some symmetrical marks on the crown and occiput; two longitudinal bands on the occiput and nape, sometimes confluent in front and behind; lower surface yellowish with or without small brown spots.

Total length, 1220 mm.; tail 260 mm.

I have not examined any Costa Rican specimens of this species.

Genus DRYMARCHON Fitzinger

Drymarchon, Fitzinger, Systema Reptilium, 1943, p. 26.

Genotype: *Coluber corais* Daudin.

Only a single species of this genus of very large snakes is known in Costa Rica.

Drymarchon corais melanurus (Duméril, Bibron and Duméril)

Spilotes melanurus Duméril, Bibron and Duméril, Erpétologie Générale, vol. 7, pt. 1, 1854, pp. 224-225 (type locality, Mexico).

Drymarchon corais melanurus Ruthven, Misc. Publ. Mus. Zool., Univ. Michigan, no. 8, 1922, p. 65.

In Costa Rica this species is second in size to *Constrictor constrictor imperator*. The specimen at hand, M. N. H. No. 25755, from 2½ km. west of Turrialba, measures 2634 mm. (8 ft. 8 in.); tail 410 mm.

Rostral visible above; internasals large, their common suture two thirds that of prefrontals; frontal small, as broad as long, about equal to its distance to middle of the internasals or a little longer; supraoculars two thirds width of frontal and about one sixth longer; parietals one third longer than wide, their length equal to their distance from the middle of the internasals; nostril large between two nasals, the posterior much the larger; loreal a little longer than high; preocular large, much higher than wide, widely separated from the frontal; postoculars two; temporals $2 + \frac{1}{2}$; supralabials 8-8, the fourth and fifth border eye, the fifth and seventh touch

above the smaller triangular sixth; infralabials 8-8, four touch the first chinshields, which are larger and longer than second pair.

Color above drab brown, many scales having cream edges; some dim grayish markings on outer part of many of the scales but not bordering the edges. Beginning about midway of the body, the median rows develop small gray-black flecks; these grow more numerous posteriorly so that latter fifth of body and tail shining black; on sides one can discern an indefinite black coloration on skin between scales, occasionally also visible on edges of some scales. Head above uniformly colored like anterior part of body, but the fourth to seventh supralabials with a black posterior border; there is a pair of diagonal stripes on neck, joining a black ventral scale; ventral surface flesh color, the outer posterior edges of ventrals bearing a narrow black stripe or spot, and on outer edges (about 1/7 of width) the body color encroaches on each ventral; this is sharply delineated from ventral coloration. After middle of body is passed ventrals become gradually darker until the latter fifth of body is shining coal black.

I have observed a Costa Rican specimen in the U. S. National Museum (No. 61947), without specific locality.

Genus MASTICOPHIS Baird and Girard

Masticophis Baird and Girard, Catalogue of North American Reptiles . . . , 1853, p. 98.

Genotype: *Masticophis ornatus* Baird and Girard.

One species is known from Costa Rica.

Masticophis mentovarius (Duméril, Bibron and Duméril)

Coryphodon mentovarius Dumeril, Bibron and Duméril, Erpétologie Générale . . . , 1854, vol. 7, pt. 1, p. 187 (type locality, between Cobân and Cusec, Guatemala).

Masticophis mentovarius Ortenburger, Occ. Papers Mus. Zool., Univ. Michigan, no. 139, p. 2; Dunn, Copeia, 1933, p. 214 (La Palma, Costa Rica); Smith, Copeia, 1942, no. 2, pp. 85-88.

Coluber mentovarius Brongersma, Studies on the Fauna of Curaçao, Aruba, Bonaire and the Venezuelan Islands, vol. 2, 1940, pp. 6-7.

A specimen purporting to be this species has been reported from La Palma, Costa Rica. Smith believes it is confined to the drier western part of Central America.

Smith (*loc. cit.*), has pointed out that the form occurring in Venezuela and Colombia is to be regarded as subspecifically distinct from the northern one, on the basis of juvenile coloration, and revives Peter's name *suborbitalis*. Until juvenile specimens are collected in Costa Rica, one cannot be certain whether the northern *mentovarius mentovarius*, or *mentovarius suborbitalis* is the form that occurs.

The species may be distinguished by the following synopsis: scale formula 17-15-13; ventrals 189-208; subcaudals 111-119; seven supralabials (the normal fourth and fifth labials of the other species are fused below eye to bring about the reduction to seven); infralabials ten, rarely eleven; two preoculars, lower very small; two postoculars, temporals 2 + 2 + 2 usually; anterior chinshields wider and shorter than posterior; loreal a little longer than high.

Dark brown to brown-gray; sides of neck may show some trace of longitudinal stripes on rows one and two. Posteriorly the body becomes lighter, and in some specimens almost every scale has one or more elongate small gray marks; head uniform dark brown, with dark markings on the side of the head; infralabials immaculate or covered with large blotches; anterior belly marks vary from small gray dots to large black blotches; posteriorly the belly is usually immaculate cream.

Genus LEPTODRYMUS Amaral

Leptodrymus Amaral, Bull. Antiv. Inst. Amer., vol. 1, 1927, p. 29.

Genotype: *Salvadora grahamiae* Baird and Girard.

A single species is known from Costa Rica. The genus ranges from southern United States to Costa Rica.

Leptodrymus pulcherrimus (Cope)

Masticophis pulcherrimus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 26, 1874, p. 65 (western side of Central America).

Leptodrymus pulcherrimus Bogert, Amer. Mus. Novitates, no. 1352, 1947, pp. 1-14.

Rostral broadly visible above; internasals about as long as wide, as long as prefrontals; frontal longer than its distance from the snout tip, shorter than the parietals; nasal divided, the nostril chiefly in the posterior part; loreal twice as long as high; one large preocular, not reaching frontal; three postoculars, subequal; temporals 2 + 1 + 1 + 2 (2 + 1 + 2 + 2); supralabials 9-10, the fifth and sixth entering the orbit; infralabials 10-11, five (or six) bordering first chinshields, which are a little shorter than second pair.

Scale formula: 17-17-15, with paired pits; scales of median dorsal row smallest; ventrals 203, subcaudals 126 + (tip missing).

Top of head olive; ground color gray on sides; two black stripes begin on snout, pass through eye and on body to tail; chin and labials cream; venter cream.

The ventrals throughout the known range of the species vary from 199 to 210; subcaudals vary from 148 to 152.

I have examined a Costa Rican specimen in the U. S. National Museum. Bogert, *loc. cit.*, lists a specimen from Pacaca, Costa Rica. These records are the southernmost known for the species.

Genus LEIMADOPHIS Fitzinger

Leimadophis Fitzinger, Systema Reptilium, 1843, p. 26.

Genotype: *Natrix almadensis* Wagler.

One species occurs in Costa Rica.

Leimadophis taeniurus juvenalis Dunn

Leimadophis taeniurus juvenalis Dunn, Copeia, 1937, no. 4, p. 213 (type locality, San José, Costa Rica).

? *Liophis (Rhadinaea) cobella* Wettstein, Sitzber. Akad. Wiss. Wien, vol. 143, 1934, p. 341.

This is a common snake in Costa Rica. Six specimens were taken, the series including both young and adult. The snake when annoyed flattens its body greatly, thus spreading the scales and exposing the bright red color on the skin and scale edges between the black bands. The red color is largely concealed when the body is not distended. Sometimes the snakes rear the head in cobralike fashion and attack menacingly.

The general coloration of the snake is black dorsally. Thirty-five bands present on the body, separated by lighter bands, in which the skin between the scales, as well as the concealed edges of most of the scales, is red; head black, labials yellow; below, chin and anterior part of neck creamy white, the cream washed with orange anteriorly, but posteriorly venter deep coral to orange red; somewhat triangular black spots on outer sides of ventrals (sometimes the black spots alternate). These are absent on anterior part of neck. First row of scales deep olive green anteriorly, grayish posteriorly on latter three fourths of body.

There are 23 maxillary teeth, followed after an interspace by two enlarged fangs. One of the specimens, No. 699, contained in its stomach a partly digested *Eleutherodactylus* of an undetermined species.

Dunn, *loc. cit.*, has identified Wettstein's specimens of *Liophis (Rhadinaea) cobella* from Bebedero and Irazú as probably belonging in this species.

TABLE OF DATA ON LEIMADOPHIS TAENIURUS JUVENALIS

Museum	No.	Sex	Ventrals	Subcaudals	Supralabials	Infralabials	Scale formula
R.C.T.	651	(yg.)	140½	54	8–8	10–10	17–17–15
R.C.T.	699	♀	145	62	8–8	10–10	17–17–15
R.C.T.	729	(yg.)	146	55	8–8	10–10	17–17–15
M.N.H.	25750	♂	142	52	8–8	10–10	17–17–15
M.N.H.	25751	♀	146½	54	8–9	10–10	17–17–15
M.N.H.	25752	♂	145	53	8–8	10–10	17–17–15

Genus LAMPROPELTIS Fitzinger

Lampropeltis Fitzinger, Systema Reptilium, 1843, p. 25.

Genotype: *Herpetodryas getulus* Schlegel.

There is a possibility that three separable forms occur in Costa Rica. These are *Lampropeltis doliata polyzona, L. d. micropholis* and *L. d. gaigae*. The first is said to intergrade with the second, and if true, both forms may likewise occur in typical state. The status of the third may be questioned since the young seemingly cannot be told certainly from the young of the other subspecies. The adults, which often reach a length of six feet, may become black, losing most, if not all, of the color markings.

KEY TO THE SUBSPECIES OF LAMPROPELTIS DOLIATA *

1. Adults black; dorsal scale rows usually 19, rarely 21 ..... *gaigae*
   Adults ringed, not black; dorsal scales rarely 19, almost always 21 or 23 2
2. Dorsal scale rows 21 or 23 in both sexes; caudals average 48 or more; usually two anterior temporals; light areas between black rings narrower; snout black with a light cross-bar ..... *polyzona*
   Dorsal scales rarely 19, usually 21 in males, never 23 in males, 21 to 23 in females; caudals average 46 or less, females average under 44; usually one anterior temporal; light areas broader; snout spotted ..... *micropholis*

Lampropeltis doliata polyzona Cope

Lampropeltis polyzona Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 258 (Quatupe, near Jalapa, Mexico); Blanchard, U. S. Nat. Mus. Bull., no. 114, 1921, pp. 139-149.

Lampropeltis triangulum polyzona Dunn, Occ. Papers Mus. Zool., Univ. Michigan, no. 353, Apr. 28, 1937, pp. 1-11.

This form is a black, yellow (cream) and red snake belonging to the harmless "coralillos." The bands are arranged in triads, black-yellow-black separated by interspaces of red (usually black dotted); the number of these triads varies tremendously in number, from 17 to 37 as understood by Blanchard, *loc. cit.* (average of 25 *fide* Stuart, Occ. Papers Mus. Zool., Univ. Michigan, no. 309, March, 1935, pp. 1-6). The head is black to near the end of the parietals and there is usually a yellow band across the snout. The anterior temporals are normally 2-2. A curving yellow band is continuous across back of head covering back part of parietals and then passing under chin. The ventrals of southern (Nicaraguan) specimens vary between 223-231 ♂ and 228-234 ♀. (Data largely from Dunn, 1937.)

* Data from Dunn, Occ. Papers Mus. Zool., Univ. Michigan, No. 353, Apr. 28, 1937, pp. 1-11.

[*Lampropeltis doliata gaigae* Dunn]

Lampropeltis triangulum gaigae Dunn, Occ. Papers Mus. Zool., Univ. Michigan, no. 353, Apr. 28, 1937, pp. 9-11 (Boquete, Chiriquí, Panamá; also reported from Volcán Barba, Monte Redondo, Volcán Irazú and Paloma. The subspecies name is probably intended for *gaigeae* and presumably intended to honor Mrs. Helen Thompson Gaige, since the type is said to have been collected by "the Gaiges").

This color form has been named from certain Panamanian and Costa Rican specimens, all coming from considerable elevation (3900-6500 ft.). The young are brilliantly colored like lowland specimens, but the adults are black. I suspect it would be impossible to separate the forms save on fully adult specimens. Presumably the number 19 for scale rows is more common than 21 or 23. From the data offered, the scale characters have the same variations as the presumed intergrades of *micropholis* and *polyzona*. It is conceivable that one or both forms listed as belonging to *micropholis* may belong here.

Lampropeltis doliata micropholis Cope

Plate IX

Lampropeltis micropholis Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 257 (Panamá).
Coronella doliata formosa (*part.*) Jan. Iconographie Générale des Ophidiens, livr. 14, Dec. 1861, pl. 4, "fig. B*" (composite, but fig. B chosen as type. See following reference).
Lampropeltis micropholis Blanchard, U. S. Nat. Mus. Bull. No. 114, 1921, pp. 149-152.
Lampropeltis triangulum micropholis Dunn, Occ. Papers Mus. Zool., Univ. Michigan, no. 353, Apr. 28, 1937, pp. 1-11.

Dunn, *loc. cit.*, has suggested that the form *Lampropeltis doliata micropholis* intergrades with *L. d. polyzona* to the north. Of the two specimens of *Lampropeltis* available in the collection, one R.C.T. No. 1026 was taken from the Pacific slope of Cerro de la Muerte at an elevation of approximately 5500 ft., and the other from Isla Bonita (M.N.H. No. 25164) on the eastern slope of Volcán Poás, at an elevation of approximately 5500 ft.

The general characters of these specimens are as follows (where data vary, the first is No. 1026, the second, No. 25164): rostral large, the length of the part visible above greater than length of internasals; common suture of latter scales as long as that of prefrontals; frontal very broad, equal or a fifth larger than the distance to tip of snout; the parietals equal to their distance from middle of internasals; nasal divided; loreal trapezoidal, longer than high; a large preocular separated from frontal; two postoculars; temporals 1+2 (1+3), but with a tiny intercalated scale bordering the parietal on left side; supralabials 7-7, third and fourth bordering orbit; infralabials 9-9, four touching anterior chinshields, which are nearly

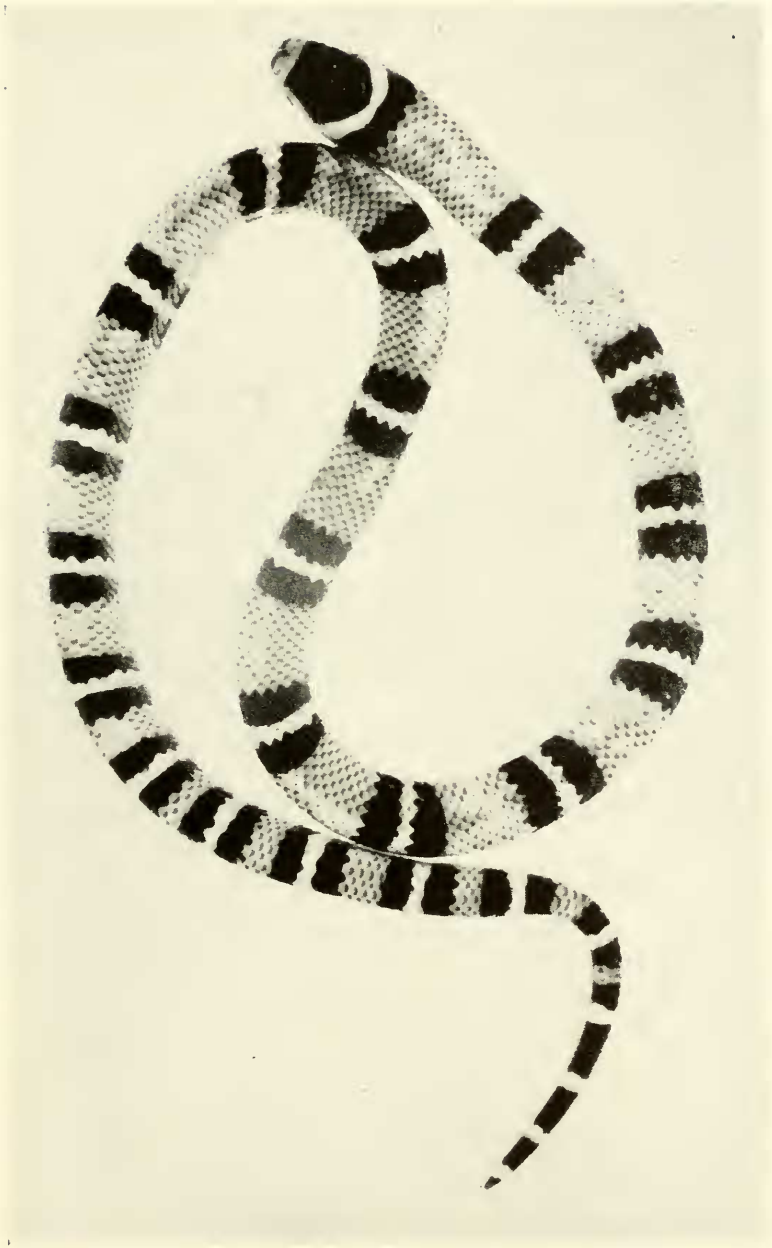


PLATE IX. *Lampropeltis doliata micropholis* Cope, RCT No. 1026, Pacific slope of the Cerro de la Muerte, Costa Rica; approximate elevation 5500 feet. About natural size.

double area of second pair. Scale rows 21-19-19-15(14), (21-19-19-17), all smooth with widely separated pits; ventrals 231, subcaudals 48 (230, 51).

Color pattern of No. 1026 is shown in Plate No. 9. The triads (black-yellow-black) are 19, separated by red areas of greater length than the triad except for the last five; head black with a narrow light band across snout (on prefrontals and internasals) and a narrow curved light band on back of head, bordered by a similar black band and involving back ends of parietals; the light band curving forward to near eye and across throat and chin where it widens; one postocular with a white area, as is true of the preocular; first four supralabials black or with a black area; five anterior infralabials same; seven white rings on tail, only first two or three forming triads; red absent on posterior part of tail; red scales with dark spots indicated; venter with red and white areas immaculate.

In No. 25164 the curving band is indicated by a cream spot on back ends of parietals and adjoining body scales, but black of head joined, by a broad bridge, with the curving nuchal black band; the whitish area on the fifth and sixth supralabials, and those across chin, have some darker markings. There are 17 triads, the intervening red areas always greater than length of combined parts of triads; ventral red and yellow areas with much black; dorsal scales of red bands with discrete black spots on anterior tip of scales; on white (yellow) bands, spots are larger and irregular, almost obscuring the band.

I have referred these forms to *micropholis* on the basis of the reduced number of triads, the single anterior temporal and the wide bands of red.

Genus PLIOCERCUS Cope

Pliocercus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 253.

Genotype: *Pliocercus elapoides* Cope.

One species is recorded from Costa Rica.

KEY TO SPECIES OF PLIOCERCUS IN COSTA RICA

Rings on body fewer, 14, on tail 8; ventrals 127, subcaudals 120, 3 preoculars ..... *dimidiatus*

Rings on body more numerous, 22½, on tail approximately 11; ventrals 137, subcaudals (?); 2 preoculars ..... *annellatus*

Pliocercus dimidiatus Cope

Pliocercus dimidiatus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 190 (type locality, Arriba, Costa Rica) and Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol 8, 1876 (1875), p. 138; U. S. Nat. Mus. Bull. no. 32, 1887, p. 79.

Elapochrus dimidiatus Günther, Biologia Centrali-Americana, Oct. 1893, p. 107 (Costa Rica).

Urotheca elapoides (part.) Boulenger, Catalogue of the Snakes of the British Museum, 2nd ed., 1894, pp. 182-183; Werner, Zool. Jahrb., Bd. 57, 1929, p. 122.

Urotheca dimidiata Gaige, Hartweg, and Stuart, Occ. Papers Mus. Zool., Univ. Michigan, no. 357, 1937, p. 16.

Pliocercus euryzona dimidiatus Dunn and Bailey, Bull. Mus. Comp. Zool. Harvard Coll., vol. 86, no. 1, 1939, pp. 11-12.

The type of this black and red banded snake has the following characters: Top of rostral round, curved back on upper surface; internasals small, about one half the length of the prefrontals; lateral borders on the frontal nearly parallel, the scale pentagonal; parietals large; temporals 1 + 1; loreal nearly a rhomb; three preoculars, the lower cut from a labial; two postoculars; supralabials nine, the fifth and sixth enter orbit; nine infralabials; chinshields equal; scales in 17-17 rows; ventrals 127, subcaudals 120.

Red above crossed by 14 black rings on body and eight and part of another on tail; these separated by nearly equal spaces below, and rather narrower spaces above (3½ scales); a black nuchal band 8 scales wide involving posterior part of the parietals; a red band across back of head; anterior part of head black, the first two labials whitish.

I have examined the type specimen.

[*Urotheca lateristriga* (Berthold), now placed in the genus *Rhadinaea* has been reported from Costa Rica but the reports were possibly based on species other than *lateristriga*.]

Pliocercus annellatus sp. nov.

Plate X, text fig. 4

Type—U. K. M. N. H. No. 25370; Morehead Finca, five miles southwest of Turrialba, Costa Rica. E. H. Taylor, collector; 1947.

Diagnosis—Related to *Pliocercus dimidiatus* but having 22½ body bands instead of 14, two instead of three preoculars; eight supralabials, the fourth and fifth entering orbit, instead of nine with the fifth and sixth entering orbit.

Description of type specimen—Rostral low, visible above as little more than a line; internasals small, wider than long, their common suture half that between prefrontals; latter scales longer than wide, with a distinct rounded canthus, the snout rather narrowed; frontal about one-fourth longer than wide, its length equal to its distance from the rostral, the anterior border straight, the sides almost parallel; parietals longer than frontal, their length a little less than distance to middle of internasals; nasal divided; loreal somewhat trapezoidal; two preoculars, the upper large, but not touching

frontal, the lower small, wedged in between the third and fourth supralabials; two subequal postoculars; supraoculars slender; temporals 1 + 1 + 2 (1 + 2 + 2); supralabials 8-8, the fourth and fifth border orbit; 9-9 infralabials, five touching the first pair of chinshields, which are as long or slightly longer than second pair; scales smooth, lacking apical pits, in 17-17-17 rows; ventrals 137, the first separated from chinshields by one pair of scales; subcaudals 73 + with a portion of the tail missing.

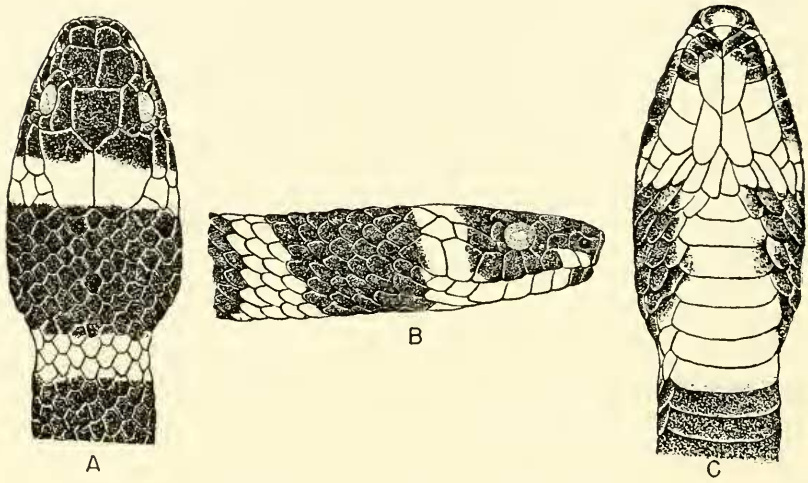


FIG. 4. *Pliocercus annellatus sp. nov.* Type. MNH No. 25370. Morehead Finca, 5 miles SW Turrialba, Costa Rica. A, Head, dorsal view; B, Head, lateral view; C, Head, ventral view.

Dorsally banded red and black; the black bands 22½ in number (including nuchal), five or six scale-lengths long, the red bands two or two and a half scales. Color white or cream-white on the neck and chin, gradually becoming tomato-red in the middle and posterior parts of body; the black bands occupy three or four ventrals, the red two or three; tail partly missing but 6½ bands present (three or four more bands probably present on the part missing); caudal black bands a little longer than those on body; head deep black to level of middle of parietals except for a white spot on first two supralabials; white band crosses back of head not reaching the posterior tip of parietals; chin and lower lip cream save for first four infralabials, anterior tips of first chinshields, and parts of the mental, which are black; the nuchal black band interrupted mesially.

Measurements in mm.: Total length, part of tail missing, 699; snout to vent 464; length of head 23; width of head, 14.

Remarks: The other form of this genus that might be expected to occur in costa Rica is *Pliocercus euryzonus euryzonus*. That form may be readily separated from *annellatus* by the pattern of the black bands which on the dorsal surface leaves bands of red only one, or more frequently, only one-half scale length wide; the band across occiput usually is of the same width. The type description of this form states that the snout is broadened at the muzzle; the temporals

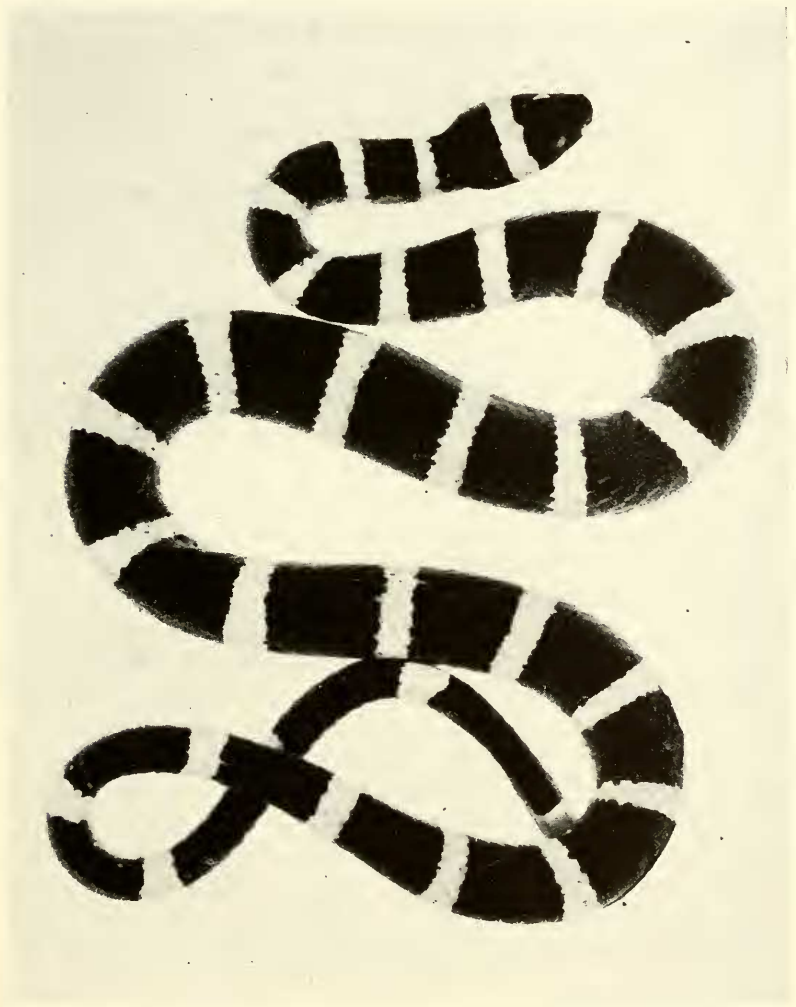


PLATE X. *Pliocercus annellatus sp. nov.*, MNH No. 25370, Morehead Finca, 5 miles SW Turrialba, Costa Rica; total length, 699 mm.

are said to be "one large and four small," the supralabials are nine, the fifth and sixth entering orbit; 10 infralabials present; the number of bands on body is 19; on tail, 11.

It would appear that *Pliocercus annellatus* represents a species intermediate between *dimidiatus* and *euryzonus*. It is conceivable that it does bear a subspecific relationship to one or the other of the two, but this is surmise.

Genus LIOPHIS Wagler

Liophis Wagler, Natürliches System der Amphibien, 1830, p. 187.

Genotype: *Coluber cobella* Linnaeus.

A single species of this genus has been reported in Costa Rica. The genus is South American and there may be some doubt that the records here presented are authentic.

Liophis cobella (Linnaeus)

Coluber cobella Linnaeus, Museum Adolphi Friderici regis, 1754, p. 24, and Systema Naturae, vol. 1, 1766, p. 378 (type locality, Asia [in error]).

Rhadinaea cobella Boulenger, Catalogue of the Snakes in the British Museum, vol. 2, 1894, pp. 166-167. (South American localities.)

Liophis cobella Peters, Monatsb. Akad. Wiss. Berlin, 1859, p. 276 (Costa Rica).

? Liophis (= *Rhadinaea*) *cobella* Wettstein, Sitz. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. 1, Band 143, Heft ½, 1934, p. 34 (Costa Rica); Dunn, Copeia, 1937, no. 4, p. 213.

The reference by Wettstein (*loc. cit.*) of two specimens, one adult from Volcán Irazú, 2400 m., and a half grown one from Bebedero, to the species *Liophis (Rhadinaea) cobella*, is I believe the second record of the species for Costa Rica. That of Peters, *loc. cit.*, is the first. Wettstein states that he has compared the specimens with numerous specimens of *cobella* in the Vienna Museum.

The specimens are bright gray brown, with bands of black. The outer scale edges bear light streaks especially on the anterior part of the body. The venter is bright orange (perhaps red in life); the ventrals are 149-147; the subcaudals 58.

Boulenger, *op. cit.*, gives the following characters: rostral broader than deep, visible from above; internasal as long as broad or a little broader, approximately as long as the prefronals; frontal once and a half to once and three fourths as long as broad, about as long as its distance from end of snout, a little shorter than parietals; loreal as long as high or a little longer; preocular one, postoculars two; temporals 1+2; supralabials eight, fourth and fifth border eye; five infralabials touch first chinshields which are as long as or a little longer than second pair. Scales in 17 rows. Ventrals 143-163; anal divided; subcaudals 45-57. Tail 4⅔ to 6 times in total length.

Brown or blackish above with whitish lines and crossbands; belly yellow (coral red in life) with transverse black spots or crossbands, always more or less marked in young, which have a blackish nuchal collar edged with whitish, and a pair of whitish dots on parietal shields; upper labials yellowish.

Genus RHADINAEA Cope

Ithadinaea Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 15, 1863, p. 100.

Genotype: *Taeniophis vermiculaticeps* Cope.

This genus of small terrestrial snakes is represented by a rather extraordinary number of species, no less than nine having been reported. A species, *Rhadinaea güntheri* Dunn,* a new name for *Tachymenis decipiens* Günther,† is treated in the genus *Coniophanes*, a genus similar to *Rhadinaea* in many ways, but having grooved posterior teeth. I suspect that the name should be suppressed since *Tachymenis decipiens* and *Rhadinaea decipiens* are probably not congeneric. If not a member of the genus *Coniophanes*, it might well be treated under a generic name of its own. References of *Rhadinaea lateristrigata* for Costa Rica are seemingly based on other species.

The genus *Rhadinaea* has recently undergone a partial revision by Dr. J. Bailey (Occ. Papers Mus. Zool., Univ. Michigan, No. 412, 1940).

SYNOPSIS OF COSTA RICAN SPECIES OF RHADINAEA

1. Scales in 19 rows; eight supralabials, the 4th and 5th entering the eye; one preocular; ventrals 164-169; subcaudals 60-78; dark brown with six longitudinal yellow or cream lines; belly yellowish with black dots on ends of ventrals. . . *serperastra*
   Scales in 17 rows 2
2. No narrow discrete continuous light lines on sides of body (discrete line may be present on neck then replaced merely by indefinite dim lighter lines) 3
   One or two narrow discrete light lines on side of body 6
3. Six or seven supralabials, 3rd and 4th enter eye; nasal single; tail not more than one fourth of total length; one preocular, two postoculars; the two pairs of chinshields of about equal length; ventrals 152, subcaudals 46; dark brown above, with a narrow black vertebral stripe; two lateral paler stripes; a black stripe along the ends of the ventrals; labials black bordered; belly yellow, with black crescents on front of each ventral suture; a black line under tail . . . . . *calligaster*
   Eight supralabials, 4th and 5th enter eye 4
4. No continuous line passing through eye and to snout tip; length of tail more than one third of total length; two preoculars (rarely one); ventrals 117-137; subcaudals 90-120; anterior chinshields shorter than posterior; a slightly darker median stripe, black edged, about three scales wide; a lateral black-edged light yellow stripe, cream anteriorly, on 4th or 4th and 5th rows; lower sides darker forming a broad dark stripe; ventrals more or less black-spotted on ends; a black-edged stripe on parietal and an ocellus on side of neck . . . . . *decorata decorata*
   Dark lines on head and body continuous, passing through eye 5

* Copeia, 1938, no. 4, p. 198.

† Biologia Centrali-Americana, Mar. 1895, p. 163, pl. 53, fig. A.

5. Lower surface of body pinkish, the ventrals finely sprinkled all over with blackish; one preocular, two postoculars; anterior chinshields shorter than posterior; ventrals 132, subcaudals 66; reddish brown above, a black lateral line between 4th and 5th scale rows, edged with yellow on anterior part of body; this line widens on neck and head passing through eye, joining its fellow on end of snout; upper lip white; length, 430 mm.; tail, 140 mm.....*pulveriventris*
Lower surface of body yellowish white, the ends of the ventrals bearing deep brown dots; one preocular, two postoculars; anterior chinshields shorter than posterior; ventrals 117, subcaudals 79; yellow-brown above with two deep brown dorsal streaks, separated by width of one scale, diverging on neck and extending to the outer posterior angle of supraocular shield; another dark streak on each side of head and body passing through eye; head brown vermiculated with yellowish; total length 330, tail 115.....*vermiculaticeps*
6. Two discrete lateral light lines..... 7
One discrete light lateral line (may be dim before shedding); subcaudals less than 70; one preocular, two postoculars; temporals 1 + 1; eight supralabials, fourth and fifth entering eye; ventrals 133, subcaudals 50; total length 335 mm.; tail in total length 3⅗ times; scales of outer row with gray tips forming an indistinct lateral line. Black above, the lower lateral scale rows a shade of rufous; head black-brown; labials yellow bordered above by blackish; below yellow, each ventral with black ends.....*pachyura pachyura*
7. Two narrow light lateral lines on sides, the lower occupying the middle of first scale row, the upper, the middle of the fifth; tail three fourths of body length; head narrow, elongate; ventrals 131-151, subcaudals 113; supralabials eight, fourth and fifth enter orbit; one preocular (rarely a "presubocular"); one or two postoculars; temporals 1 + 1 + 2; above brownish black, lower parts yellow with the ends of the ventrals blackish; markings in females fainter; an occipital light band
pachyura decipiens
Blackish dorsally, on belly immaculate red; a black line on edge of ventrals and outer edge of first scale row from throat to tail; immediately above this, a white line from throat on middle of row one to end of tail; a white line on fifth scale row; light ocellae on outer corner of parietals, a larger one behind temporals joining lateral line; total length 440 mm., tail 188; seven or eight supralabials; ventrals 137-143, subcaudals 96-112; temporals 1 + 1; one preocular, two postoculars (one "presubocular" usually present), 3rd and 4th or 4th and 5th labials enter orbit; no occipital light ring.....*persimilis*

Rhadinaea serperastra Cope

Rhadinaea serperastra Cope, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 212 (type locality, Costa Rica); Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 140.

Scales in 19 rows, smooth, lacking pits; temporals 1+2+3; nasal divided, the posterior part larger; supralabials eight, the fourth and fifth border eye; loreal square; preocular one; postoculars two; supralabials eight; chinshields subequal in length; ventrals 164; subcaudals 78; anal divided. Maxillary teeth equal.

Dark brown with six longitudinal yellow or white lines of which the first and second are brightest; a white line on each side produced by a series of dark spots on ends of ventrals; labials black with yellow spots; head dark brown above with a pale shade across frontal, and two [spots?] just behind the parietals; chin and belly yellowish (after Cope).

A specimen in Harvard M.C.Z. (No. 28069) is from San José, Costa Rica. There are present 170 ventrals and 65 subcaudals.

Other characters are very similar to those of the type. There is a whitish line from eye to near jaw angle. The arrangement of the lines is as follows: a median dark line; three scale rows on each side of middle, each with a dim darker line; a discrete white line on the fifth and sixth rows; a broader lateral black stripe on third, fourth and fifth rows with a fine white line through the middle; light lines on first, second and third rows, that on first scale row bordered above and below by darker lines; each labial has a white spot.

Rhadinaea calligaster (Cope)

Contia calligaster Cope, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1876 (1875), p. 146 (type locality, Pico Blanco, southern Costa Rica).

Scales acuminate in 17 rows, smooth, lacking apical pits; supralabials seven, third and fourth border the orbit; nasal single; loreal subquadrate; preocular one; postoculars two; temporals $1 + 1 + 2$ $(1 + 2 + 2)$; infralabials eight, fourth and fifth largest, the first pair barely in contact behind mental; ventrals 152, anal divided, subcaudals 46; chinshields equal. Maxillary teeth gradually increasing in length to the posterior.

Color above dark brown with a narrow vertebral black band; two lateral paler bands, the lower on the first and second scale rows, the upper on the fourth and fifth, the space between black. A black band along the edge of ventrals; belly yellow, each ventral with a black crescent or with a black base; labials black-bordered.

Known from Pico Blanco, Costa Rica; the exact elevation on the mountain unknown (5000-7000 ft).

The types (U.S.N.M. Nos. 30606-30607) at the present time are in a poor state. Another specimen in the U. S. National Museum (No. 38335) has 147 ventrals, 60 subcaudals. The general color is violet-brown.

Rhadinaea decorata decorata (Günther)

Plate XI

Coronella decorata Günther, Catalogue of the Colubrine Snakes in the Collection of the British Museum, 1858, pp. 35-36 (type locality, "Mexico").

Rhadinaea decorata Cope, Proc. Amer. Philos. Soc., vol. 22, 1885, p. 381.

Rhadinaea decorata decorata Bailey, Occ. Papers Mus. Zool. Univ. Michigan No. 412, May 6, 1940, pp. 7-8, plate 2, fig. 5 (Costa Rican specimen).

A specimen of this species was captured in the mountains one mile west of La Suiza at about 2400 ft. elev. It was found coiled

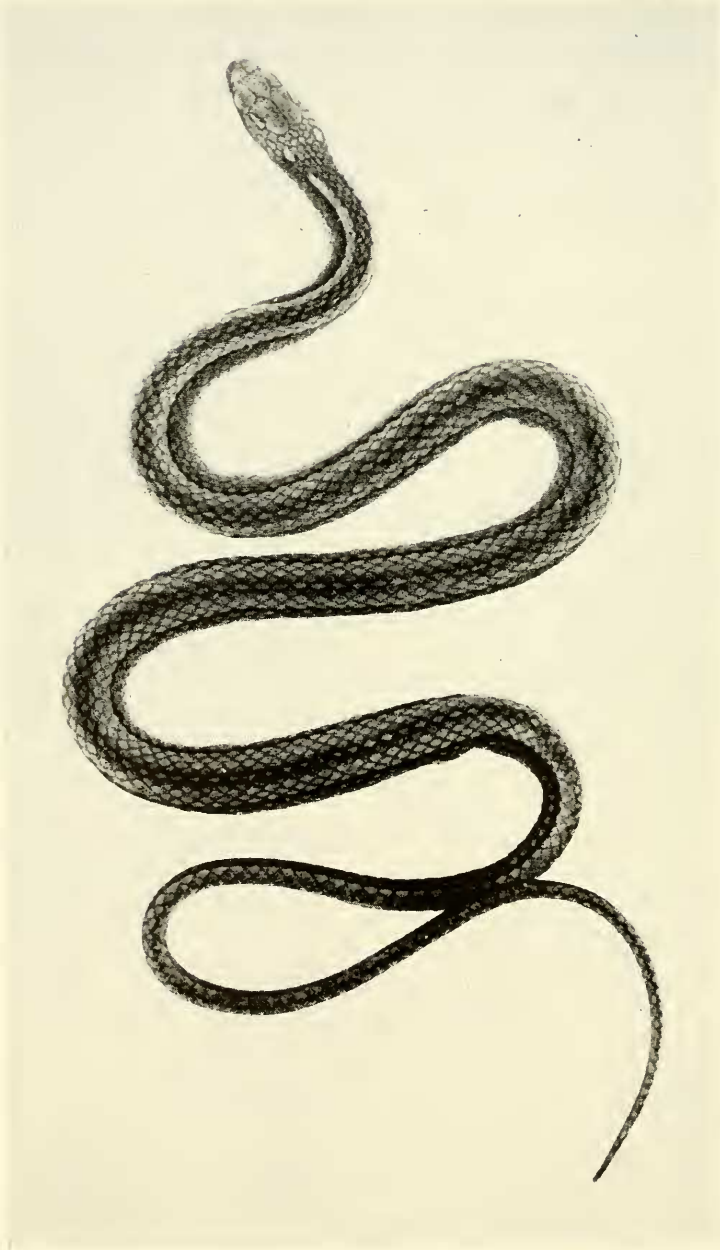


PLATE XI. *Rhadinaea decorata decorata*, MNH No. 25733, La Suiza, Costa Rica, approximate elevation 2400 feet. Total length, 421 mm.

under a small flat rock in a gully. The scale characters of this specimen are as follows:

Eye moderately large; the head distinct from neck; rostral distinctly broader than high, the scale scarcely visible from above; length of internasals in that of prefrontals about one and one third times; width of frontal at least three fifth of its length; length of frontal a third longer than its distance from the end of snout; parietals elongate, equal to their distance from the tip of snout; nasal divided, the posterior part much the largest; loreal nearly square; one preocular (partially divided on both sides) and a small "presubocular" below preocular; two postoculars, only one touching the temporal; formula for temporals, 1 + 2 + 3; supralabials 8-8; the fourth and fifth entering orbit; infralabials 10-10, five touching chinshields; first pair of chinshields about one sixth shorter than the second pair; latter in contact for nearly half their length; scales without apical pits, finely striated but not keeled. Ventrals 126; subcaudals 94 +; anal divided; total length, 421 mm.; tail, 160 mm.

Top and upper part of the sides of head brownish cream with minute blackish flecks, the bones semitransparent so that the brain can be seen dimly. Lips and chin white. A black line borders the upper labials to near the jaw angle; an elongate black-edged light stripe on outer border of parietal, and another rounded ocellus-like spot on beginning of neck. Middle scale row and two adjoining rows blackish gray beginning on neck; a light cream stripe covering sixth row and parts of adjoining rows (more posteriorly, all or nearly all of these rows). Below this there is a broad, dark gray line extending onto the outer edge of ventrals; this color on ventrals terminates in a black dot on anterior ventrals, which may be dim or almost indistinguishable posteriorly. Anteriorly the first scale row may bear a narrow light line. Below yellowish about neck, changing to orange then to tomato-red on the remainder of body.

In the collection of the U. S. National Museum, I examined six specimens from "Costa Rica", one from Suretka, C. R. The ventral-subcaudal counts on No. 9788 are 120, 88 +; Nos. 30609-30612 have respectively 116, 72 +; 117, ?; 123, 96; 114, ?. The Suretka specimen has 119 ventrals, and 110 subcaudals.

These agree in all essential characters with the specimen described except that sometimes there is a small light spot in front of the upper eye level; sometimes this is absent.

Specimens in Harvard M.C.Z. represent the following localities: Guápiles, Suretka, St. Cecilia and Limón.

The species has a wide distribution throughout Central America and southern Mexico.

Rhadinaea pulveriventris Boulenger

Rhadinaea pulveriventris Boulenger, Catalogue of the Snakes in the British Museum, vol. 3 (addenda and corrigenda), 1896, pp. 635-636 (type locality, Costa Rica).
Liophis (= *Rhadinaea*) *pulveriventris* Wettstein, Sitz. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. 1, Bd. 143, Heft 1-2, 1934, pp. 34-35 (Volcán Irazú, 1500 m.).

Eye rather small; rostral just visible from above; internasals broader than long, much shorter than the prefrontals; frontal longer than its distance to end of snout, shorter than parietals; loreal longer than deep; one preocular; two postoculars; temporals 1 + 2; supralabials 8-8, fourth and fifth entering orbit; five infralabials touch anterior chinshields, which are shorter than posterior; scales in 17 rows; ventrals 132; anal divided; subcaudals 66.

Reddish brown above; a black lateral line between the fourth and fifth scale row, edged with yellowish on the anterior part of body; these lines widen on neck and head and passing through eye join each other on the end of the snout; upper lip white; belly pinkish yellow, finely speckled all over with blackish.

Wettstein, *loc. cit.*, reports a specimen from Costa Rica. It agrees with the type in essential characters. The following data are from Wettstein's report: Maxillary teeth, 18 + 2; mandibular, 20-21; scale rows, 17; ventrals 149; subcaudals 55; supralabials 8, the 4th and 5th entering eye; first chinshields shorter than second pair, and in contact with four infralabials (5 in type); one preocular; two postoculars; temporals 1 + 2; total length, 444 mm.; tail, 106 mm.

A specimen in Harvard, M.C.Z. No. 15261, from Navarro, Costa Rica, has 129 ventrals and 67 subcaudals; the scale-row formula is 17-17-15. In this specimen the venter is almost immaculate. The pigment flecks are reduced, there being very few along the edges of ventrals. Total length, 500 mm.; tail, 145. In other essential characters the specimen agrees with the type.

Rhadinaea vermiculaticeps (Cope)

Taeniophis vermiculaticeps Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 249 (type locality, Veragua, Panamá).
Rhadinaea vermiculaticeps Cope, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 101 (Costa Rica).

Scales in 17 rows; one preocular, two postoculars; eight supralabials, the fourth and fifth entering eye; frontal elongate; loreal as long as deep; ventrals 117; anal divided; subcaudals 79.

Yellowish brown on dorsal surfaces with two deep brown dorsal streaks, separated by the width of one scale, diverging on the neck

and extending to the outer posterior angle of the supraocular shield; another dark streak on side of head and body passing through eye; head generally brown above with vermiculations of yellow; labials whitish narrowly edged with brown; chin and belly yellowish white, each ventral with dots on outer borders. Total length 330 mm.; tail 115 mm.

I find one record (Cope, *loc. cit.*) of the species from Costa Rica without definite locality.

Harvard M.C.Z. No. 42764 from Piedras Pecora Ridge, Panamá, has a slight peppering of black on the outer edges of ventrals; a whitish line passing through eye, black bordered. Upper and lower labials with vermiculate blackish flecks, and black sutures.

Rhadinaea persimilis Dunn

Rhadinaea persimilis Dunn, Copeia, 1938, no. 4, Dec. 10, pp. 197-198 (type locality, La Loma, 1500 ft. altitude, Prov. Bocas del Toro, Panamá) (also reported from Cartago and La Suiza, Costa Rica and Eden Mine, Nicaragua).

Scales in 17 rows; temporals 1 + 1; preocular one, postoculars two; a small subocular usually present; supralabials seven or eight, third and fourth, or fourth and fifth entering orbit; infralabials seven or eight, four, in contact with chinshields. Males 137-143 ventrals; subcaudals 96-112.

The color above indefinite gray-brown the scales more or less edged or flecked with black; belly red, immaculate; a black line along edge of ventrals, and adjoining scale row, bordered above by a white line in the middle of first scale row; another white line on middle of the fifth scale row; a light spot on outer anterior corner of parietals, one on second temporal, and one between temporal and the lateral line. A median light spot on fifth vertebral scale behind parietals. Supralabials with black upper borders and faint flecks on rostral and anterior supralabials.

Tail more than one third of total length. Greatest known total length, 440 mm.; tail 188 mm.

The species has been reported from La Suiza and Cartago in Costa Rica.

I have examined the type.

Rhadinaea pachyura pachyura (Cope)

Contia pachyura Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 145 (type locality, Sipurio, Costa Rica).

Rhadinaea pachyura Dunn, Copeia, No. 4, 1938, p. 198; Notulae Naturae, 1942, No. 108, p. 5.

Scales in 17 rows, smooth and usually lacking pits (sometimes with one pit); head elongate, the rostral not prominent; internasals

wider than long; prefrontals as long as wide; frontal elongate but shorter than parietals; loreal large, higher than long; one preocular; two postoculars, subequal; temporals 1 + 1; supralabials eight, the fourth and fifth entering eye; chinshields equal; tail long, three and three-fifths times in total length, and thickened to near end; ventrals 133; subcaudals 50; total length 335 mm.

Color black, the lower scale row with a rufous shade. Scales of the first row with gray tips; head and a nuchal area brown, with a black line from eye above labials; latter yellowish, unspotted or with spots; belly yellowish, each scale with rather large black spots on sides.

Of this species, I have examined a specimen from Panamá, but have seen none from Costa Rica. The type is from Sipurio, Costa Rica. Dunn, *op. cit.*, states that *Rhadinaea decipiens* intergrades with *R. pachyura.*

Rhadinaea pachyura decipiens (Günther)

Ablabes decipiens Günther, Biologia Centrali-Americana; Reptilia and Batrachia, 1893, p. 105, pl. 37, fig. A (type locality, Irazú, Costa Rica).

?Urotheca lateristriga Boulenger, Catalogue of the Snakes in the British Museum, ed. 2, vol. 2, 1894, pp. 181-182 (*part.*).

Rhadinaea pachyura decipiens Dunn, Copeia, No. 4, 1938, p. 198; Notulae Naturae, No. 108, p. 4-5 (El Cedral de Navarro, San José, and La Palma, Costa Rica).

Scales in 17 rows without pits; temporals, 1 + 1 + 2; preoculars one or two; postoculars two; usually a small presubocular; supralabials eight, fourth and fifth entering eye; four infralabials in contact with the anterior chinshields; loreal present as long as high; frontal elongate, longer than its distance to end of snout; ventrals 131-151; anal divided; subcaudals 113.

Blackish brown above with two narrow yellow lateral lines, the lower on outer scale row most distinct; upper line on fifth scale row; a broad yellow band crosses the temporal region and posterior half of parietals; lower parts yellow, with the corners of the ventral scales blackish.

(SUBFAMILY BOIGINAE)

The following group of snakes, consisting of the genera *Trimorphodon, Leptodeira, Rhinobothryum, Imantodes, Oxybelis, Conophis, Clelia, Coniophanes, Erythrolamprus, Stenorrhina, Scolecophis* and *Tantilla,* are characterized by having the posterior maxillary teeth enlarged and grooved. They are often placed in the Subfamily Boiginae (Family Boigidae, [*auctores*]). It may be regarded as doubtful that a close relationship is indicated by the

dental character of grooved teeth since the groove varies considerably in its depth as well as its position on the tooth. Characters other than dentition show differences of such magnitude as to suggest that the grooved posterior fangs have developed several times in the evolution of the group. Hence the subfamily is only a term of convenience.

Some of these snakes are known to be mildly poisonous; none are known to be dangerous to man. The genera of the group likewise vary in size, *Tantilla* and *Scolecophis* being small snakes, while *Clelia* and *Trimorphodon* reach a length of considerably more than a meter. Species of *Oxybelis* have long sharp-pointed heads while those of *Imantodes* have short blunt heads. Both are aboreal in habit with slender compressed bodies. *Trimorphodon* and *Leptodeira* are at least partially arboreal. *Coniophanes*, *Conophis*, *Stenorrhina*, *Tantilla*, *Scolecophis*, *Clelia*, *Rhinobothryum* and *Erythrolamprus* are, so far as I know, terrestrial in habit. Species of *Rhinobothryum* and *Erythrolamprus* in general coloration tend to resemble the poisonous snakes of the genus *Micrurus* and may sometimes be mistaken for species of this group. The name "Corales" is applied to all snakes banded black and red, or black, yellow, and red in Costa Rica.

KEY TO THE "OPISTHOGLYPH" COLUBRIDAE OF COSTA RICA

1. Anal scale entire ..... *Clelia*
   Anal scale divided 2
2. Internasal and anterior nasal fused ..... *Stenorrhina*
   Internasal and anterior nasal not fused 3
3. Loreal usually absent 4
   Loreal present 5
4. Small, short, cylindrical snakes, terrestrial; the head short, scarcely or not distinct from body ..... *Tantilla*
   Elongate arboreal snakes with very slender bodies; head distinct from body, much-elongated (loreal present in one species) ..... *Oxybelis*
5. Two loreals present (rarely more); 10-11 maxillary teeth, the anterior distinctly longer than posterior, followed after an interspace by two moderately enlarged grooved fangs ..... *Trimorphodon*
   A single loreal present; maxillary teeth variable, the interval present or not between maxillary teeth and grooved fangs 6
6. Pupil round 7
   Pupil vertically eliptic 8
7. Maxillary teeth 20-25 forming a continuous series the last three to five largest, grooved; scales 15-17 rows smooth or feebly keeled with apical pits, arranged in oblique transverse rows; usually unicolor ..... *Oxybelis*
   Maxillary teeth 10, slightly increasing in size posteriorly, followed after an interspace by two very large grooved fangs; scales 17-19, smooth, lacking apical pits; pattern of stripes ..... *Conophis*
8. Pattern of red, black, and light (white or yellow) bands 9
   Pattern banded or spotted (large or small spots) lacking red color 10
9. Scales in 15 rows, smooth, without apical pits; ventrals less than 210; subcaudals less than 70; maxillary teeth subequal, followed after an interspace by feebly grooved fangs ..... *Erythrolamprus*

Scales in 21 rows; smooth anteriorly, partly keeled posteriorly; ventrals more than 200; subcaudals more than 70; maxillary teeth equal, followed after an interval by two grooved fangs.....*Rhinobothryum*

10. Completely banded with rings of black and yellow; scales in 15 rows, smooth, lacking apical pits .....*Scolecophis*
Not banded with rings of black and yellow..... 11

11. Pattern unicolor or with some darker longitudinal stripes; or a pattern of black, and cream, stripes; scales in 17-25 rows, smooth, lacking pits.....*Coniophanes*
Lacking such patterns..... 12

12. Body moderately slender; scales in 19-25 rows, smooth or faintly keeled with apical pits; ventrals less than 215; spots or wide bands of darker color....*Leptodeira*
Body especially slender and elongated; vertebral row of scales often enlarged; ventrals more than 215; pattern of spots forming blotches or saddles; or forming numerous small punctations.....*Imantodes*

Genus TRIMORPHODON Cope

Trimorphodon Cope, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 297.

Genotype: *Trimorphodon lyrophanes* (Cope).

One species is known from Costa Rica.

Trimorphodon biscutatus biscutatus (Duméril, Bibron and Duméril)

Dipsas biscutata Duméril, Bibron and Duméril, Erpétologie Générale, vol. 7, pt. 2, 1854, pp. 1153-1154 (type locality, Mexico).
Trimorphodon biscutatus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 297.

The presence of this species in Costa Rica is attested by two specimens in the Museum of Comparative Zoology, Harvard College, Nos. 16186, Puntarenas, Costa Rica, and 15306, Esparta, Costa Rica.

The larger of the two specimens has the following characters: rostral visible above as a broad triangle; internasal suture a little more than a half the length of the prefronal suture; frontal a fourth longer than wide, a little shorter than its distance from tip of snout; three preoculars, the lower small and more or less below eye (subocular); three postoculars; 3 + 4 temporals, three loreals, the two upper largest, more or less quadrangular; supralabials 9-9, the fourth and fifth enter orbit; infralabials 12-13, four or five touching first chinshields, which are double the size of second pair; scale formula 25-27-19-18, the six median scale rows on latter half of the body keeled; ventrals 262; subcaudals 85.

Pale grayish or brownish gray, with dark black-edged crossbars or black-edged markings with a light center. Head with chevron-like dark bands separated by similar light areas; a series of light black-edged spots on alternating (or every third) ventrals; these may connect with the transverse spots of dorsum; anteriorly a median white stripe 40 mm. long. The specimen is a very large one, having a total length of 1510 mm., the tail 238 mm.

Genus LEPTODEIRA Fitzinger

Leptodeira Fitzinger, Systema Reptilium, 1843, p. 27.

Genotype: *Coluber annulatus* Linnaeus.

Six species of the genus have been reported from Costa Rica.

KEY TO SPECIES OF LEPTODEIRA IN COSTA RICA

1. Body with 16 or less black bands; scales in 19 rows; body with the black bands three to four times broader than interspaces of whitish ground color; head black with a white collar; tail with eight black bands.....*nigrofasciata*
   Body with 20 or more black bands or spots..... 2
2. Spots on body more than 40..... 3
   Spots on body less than 40..... 5
3. Body red, banded with black; below salmon color, dusted with brown; a few undivided subcaudals follow anus; scales in 23 rows; 61 dorsal black spots...*rubricata*
   No red on body, but body usually fawn or light brown; 40-55 black spots or bands across body. Arboreal forms with somewhat compressed bodies..... 4
4. Scales of vertebral row (or rows) enlarged; 19-21 scale rows; about 52 small spots along back; lateral alternating spots dim.....*annulata annulata*
   Scales of vertebral row not enlarged; scales in 21-23 rows; spots larger, approximately 38 in number, somewhat quadrangular, usually edged with lighter color suggesting ocelli; secondary lateral spots present.....*ocellata*
5. Spots less than thirty, terrestrial forms; scale rows 23-25; crescent light spot on head interrupted medially by a black stripe connecting dark of head with neck band. One preocular (usually); abdomen yellowish white.....*rhombifera*
   Spots 20, scales in 21 rows; one preocular; one postocular; white below*....*maculata*

Leptodeira nigrofasciata Günther

Leptodeira nigrofasciata Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 1, 1868, p. 425 (type locality, Nicaragua).

The type description gives the following data on the species: scales in 19 rows; internasals nearly square, two thirds the size of the prefrontals; frontal equal to its distance from tip of snout, and a little shorter than the occipitals; loreal as high as long; one preocular, not quite reaching the frontal; a minute preocular on one side; one postocular; eight supralabials, the third, fourth and fifth border eye; none touching the parietal; temporals 1+2+3; ventrals 174, subcaudals 74.

Body with 16 elongate crossbands, which are from three to four times longer than the interspaces of whitish ground color, and confluent on posterior part of trunk. Head black above, separated by a white collar from the first black band; tail with about eight black bands. Lower parts whitish.

Two specimens have been reported from Costa Rica, one from a specific locality (Turrialba).

* Characters of the type.

Leptodeira rubricata (Cope)

Sibon septentrionale rubricatum Cope, Proc. Amer. Philos. Soc., vol. 31, pp. 333-347 (type locality, Boca Mala, Costa Rica).

Snout short, body robust; head with temporal region swollen, not especially distinct from neck; supralabials eight, the fourth and fifth enter orbit; two preoculars, two postoculars; scales in 23 rows; five undivided subcaudals follow vent; ventrals 178.

Above bright red; on venter light salmon, dusted with brown; 61 transversely oval black spots on the back which cover 12 rows of scales transversely and two and one half to three and one half longitudinally; small black spots alternate with them on third row of scales, and a less definite row of smaller spots alternate with these on second and third rows; a black band extends from eye to last labial plate and behind and above it a parallel black band extends from the parietal plate. The extremities of these bands are fused with the first dorsal spot, the interspaces being red; supralabials red with a black spot in the center of each plate; infralabials black spotted; top of head dark brown bordered posteriorly on outline of parietal plates by a red crescent; this bordered posteriorly by a black crescent, and cut by a median black stripe, which connects the dark brown of the head with the anterior four black dorsal spots. Tail blackish red, spotted above; total length, 660 mm.; tail 133 mm.

This seemingly is a species of the Pacific lowlands. It would appear to be easily recognized by the red coloration; however, only the type is known.

Leptodeira annulata annulata (Linnaeus)

Plate XII

Coluber annulatus Linnaeus, Amoen. Acad., Tom 1, no. 5, p. 120; Systema Naturae, 10th ed., 1758, vol. 1, p. 224; Andersson, Bihang till K.S.U. vet.-Akad. Handl., Bd. 21, afd. 4, 1899, p. 21.

Leptodeira annulata annulata Dunn, Proc. Nat. Acad. Sci., vol. 22, 1936, pp. 692-693 (both coasts; up to 2000 meters elevation at Tierra Blanca, Costa Rica).

The type locality of this form is not known. The six cotypes have the following scale counts: 5 with 19 rows, one with 21. Ventrals 185-193; subcaudals 80-91.

This subspecies occurs in Costa Rica and differs from the more northern form, *polysticta*, in having the scales of the vertebral series enlarged and in lacking the longitudinal dark mark on the neck.

Three specimens of *Leptodeira* are referred to this species. They are M.N.H. No. 25742, taken about five miles southwest of Turrialba; M.N.H. No. 25743 and R.C.T. No. 1462, taken at Los Diamantes,

one mile south of Gúapiles, Costa Rica. No. 25742 is young and the markings are more distinct than in the older specimens, in which some details of the pattern are obscured. Data on markings are taken from that specimen.

Top of head brown; a pure-white horseshoe-shaped mark begins behind eye and passes around behind the parietals (encroaching slightly on the sides of parietals); the width of the mark on the mid-line equal to from four to five scale lengths; behind this a brown spot sending forward narrow arms that reach the eye; supralabials with a light peppering of brown pigment; chin whitish with some little pigment on anterior part; about 52 spots along middle of back; on the sides, alternating with the median spots, can be discerned faint brownish narrow vertical spots; the dorsal ground color is lavender brown, somewhat mottled. Ventrals immaculate save for an occasional brownish speck on outer edge of scales.

The older specimens have the nuchal white band completely obscured, being pigmented as much as other dorsal areas between spots on the body.

Characters of head scales not listed in the following table are: rostral visible above as a narrow line; internasals at least two thirds the length of prefrontals; latter scales about as wide as long, separated from supraoculars by upper preocular; frontal, in contact with preocular, three fourths as wide as long, its length a little greater than its distance from end of snout; parietal nearly as wide as long, equal to its length from internasal-prefrontal suture, or a little longer; nasal at least partially divided; loreal longer than high; two preoculars, two postoculars, the upper much the larger in each case.

Three Costa Rican specimens in the U. S. National Museum, collected by William Gabb were examined (Nos. 32565-67). No. 32566 ♀ has 203 ventrals and 79 + subcaudals; No. 32565 has 197 ventrals and 93 subcaudals; the scale rows are 21 in the middle of body in both. No. 32567 is in a bad state, and counts were not attempted.

A Harvard M.C.Z. specimen from Limón, Costa Rica has 197 ventrals, 82 subcaudals; scale formula, 21-23-19-16. While this is a young specimen, it lacks the large white crescentic area described in the Turrialba specimen.

Scale Data on Leptodeira annulata annulata

No.	Sex	Ventrals	Subcaudals	Preocular	Postocular	Supralabials
25742	(yg.)	201	92	2	2	8–8
25743	♀	199	59+	2	2	9–8
1462	♂	199	94	2	2	8–9

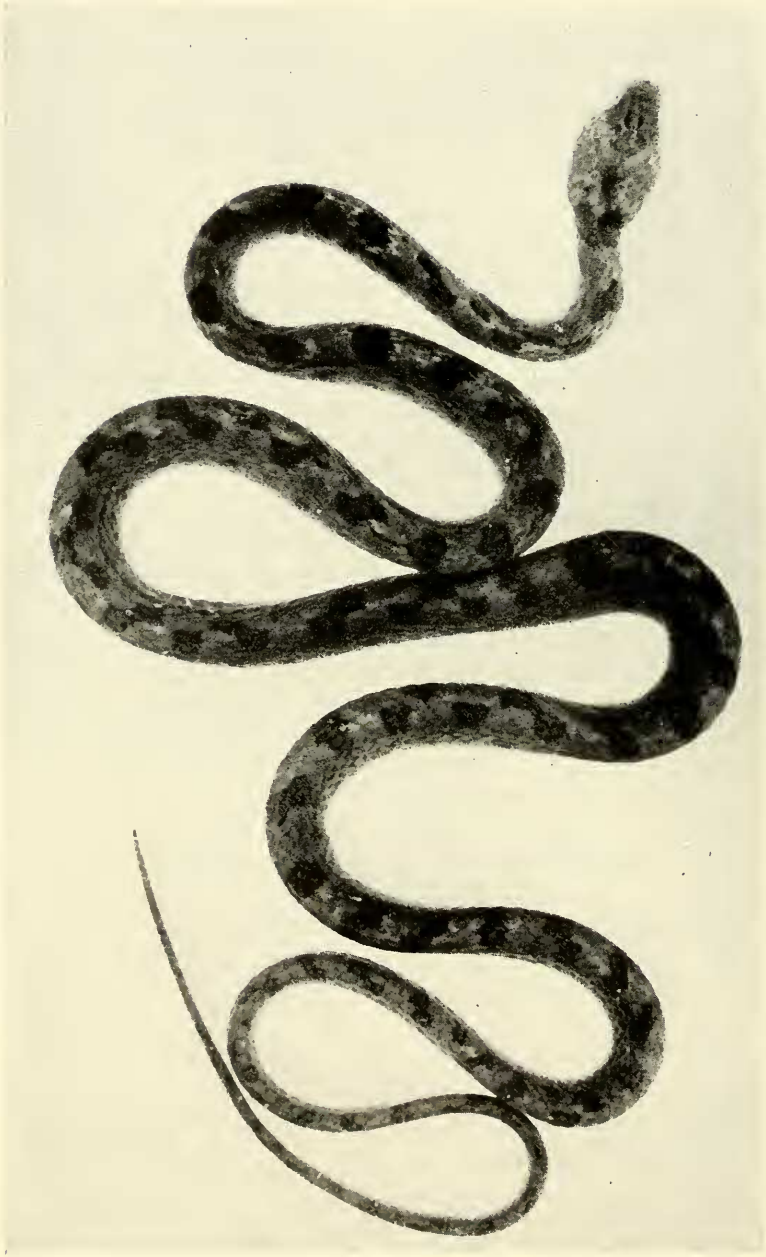


PLATE XII. *Leptodeira annulata annulata*, RCT No. 1462, Los Diamantes, Costa Rica, September 7, 1949, approximately natural size.

SCALE DATA ON LEPTODEIRA ANNULATA ANNULATA (concluded)

No.	Infra-labials	Scale formula	Body bands	Temporals	Labials contact chinshields	Labials enter orbit
25742	11–11	21–21–15	52	1 + 2 + 3 1 + 2 + 2	6–6	4–5
25743	11–11	19–23–15	49	1 + 3 + 4 1 + 3 + 3	6–6	5–6
1462	10–11	21–21–15	50	1 + 2 + 3	5–5	4–5

Leptodeira ocellata Günther

Leptodeira ocellata Günther, Biologia Centrali-Americana; Reptilia and Batrachia, May 1895, pp. 172-173, pl. 55, fig. B (type locality, Chontales Mines, Nicaragua; Costa Rica).
Leptodeira rhombifera (*part.*) Dunn, Proc. Nat. Acad. Sci., vol. 22, 1936, pp. 693-694.

The following data are taken from the type description: scales in 23 rows; internasals about one third of the prefrontals; frontal a little shorter than parietal; loreal large, square; preoculars two, the lower very small, the upper reaching the frontal, or nearly so; rarely a portion of a labial forms a small presubocular; two postoculars; eight supralabials, of which the fourth and fifth border eye; temporals 1 + 2 + 3; the two pairs of chinshields of equal length; ventrals 165-170.

Ground color reddish, or brownish olive; a series of dark brown transverse or irregularly rounded spots along the back, which do not descend to the sides and are about 38 in number on the trunk; sides with a series of round brown spots, the spots being opposite to the interspaces of the ground color and accompanied by smaller irregular spots; neck without a distinct collar and longitudinally divided in the middle by a narrow line proceeding from the first dorsal spot. Upper side of head mottled brown; a brown temporal band. Lower parts yellowish.

A specimen from Miramar, Costa Rica (U. S. National Museum No. 75037) has the following characters: a median groove in anterior part of frontal; two preoculars, the upper preocular barely separated from frontal; frontal pentagonal, the sides parallel; supralabials 8-8; infralabials 10-10, five touching first chinshields; scale formula 21-23-17; ventrals 171, subcaudals 90. There are 32 bands or spots on dorsum of body; approximately 28 on tail, those near tip indistinct. A series of small lateral spots alternate with these; venter immaculate; a bilaterally symmetrical mark on the frontal and a tridentlike mark on neck; some irregular spotting on parietals. The dorsal spots usually touch the fourth scale row.

Leptodeira rhombifera Günther

Leptodeira rhombifera Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1872, p. 32 (type locality, Río Chisoy near Cubulco, Guatemala).

This species has been reported from Costa Rica but the reports may be based on other forms. I append a brief description from Günther.

Scales in 25 rows; internasals very small; frontal as long as the snout; loreal longer than high; one preocular barely touching frontal; two postoculars; eight upper labials, of which the fourth and fifth enter the orbit; temporals 1 + 2 + 3; chinshields rather elongate, the pairs equal in length; body slender; head broad and depressed; ventrals 170.

Brownish above, the body with about 26 large subrhombic dark brown spots edged with black; yellowish cross bands brightest on median line separate the rhombic spots; upper part of head brown powdered with black; a black stripe with a yellowish margin on each side connects the crown of the head with the first rhombic spot. Abdomen yellowish, subcaudals powdered with brown.

Leptodeira maculata (Hallowell)

Megalops maculatus Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 488 (type locality, "Tahiti," [in error]; possibly Costa Rica).
Anoplophallus maculatus Cope, Amer. Naturalist, 1893, p. 480.
?Leptodeira personata Cope, Proc. Acad. Nat. Sci. Philadelphia, 1868 (1869), p. 310.
Leptodeira septentrionalis maculatus (*part.*) Dunn, Proc. Nat. Acad. Sci., vol. 22, 1936, p. 397.
Leptodeira maculata Taylor, Univ. Kansas Sci. Bull., vol 25, 1938 (1939) pp. 337-342.

Six specimens in the Museo Nacional de Costa Rica, [presumably] from Costa Rica have been identified as belonging to this species.* I have not seen the specimens.

It seems well to regard the record of this species in Costa Rica as doubtful until the form is rediscovered there.† The species is a northern one, occurring widely in Mexican lowlands.

The following characters of the type will assist in identifying *maculata*. Body moderately slender, and relatively short; prefrontals double the length of the internasals (the prefrontals are fused for more than half their length [abnormal?]); loreal elongate, much longer than high; one preocular well separated from frontal, with a curved rather than an angular front edge; one postocular (seem-

* Reported by Dunn in Proc. Nat. Acad. Sci., vol. 22, 1936, p. 697. This paper, purporting to be a revision of the Genus *Leptodeira* has attempted to unite the genus *Hypsiglena* with *Leptodeira*, and has in numerous instances wrongly synonymized forms. *Maculata* has been made a subspecies of *septentrionalis*. These two species occur together over much of the area of their distribution, and are not closely related within the genus.

† I am not wholly convinced that the form described by Hallowell is identical with *Leptodeira personata* Cope. I had hoped to find the Costa Rican species but no specimens were taken.

ingly); fourth and fifth labials enter eye; first light band six scales long; no elongate stripe on nape; 20 dark spots across body, 9 + on tail; ventrals 171; 61 + subcaudals, the tip of tail missing. Scales in 21 rows; anal divided.

Some of the spots are broken and tend to alternate or are irregular. The contrast between the spots and the light areas between them, very pronounced. The head markings are indiscernible save that the frontal appears a little darker than other dorsal head scales and the edges are somewhat lighter.

Genus OXYBELIS Wagler

Oxybelis Wagler, Natürliches system der Amphibien, 1830, p. 183.

Genotype: *Oxybelis acuminatus* = *aeneus* (Wagler).

Three species occur in Costa Rica.

KEY TO SPECIES OF OXYBELIS IN COSTA RICA

1. Scales in 15 rows (15-15-13); ventrals 177, subcaudals 162; supralabials 6, *brevirostris*
   Scales in 17 rows 2
2. Ventrals 198-217; subcaudals 139-165; supralabials 9-10 ..... *fulgidus*
   Ventrals 174-203; subcaudals 150-188; supralabials 8 ..... *aeneus*

Oxybelis fulgidus (Daudin)

Coluber fulgidus Daudin, Histoire naturelle des Reptiles, vol. 6, 1803, p. 352, pl. 80 (Port au Prince, San Domingo *ex errore*).

Oxybelis fulgidus (*part.*)Duméril, Bibron and Duméril, Erpétologie Générale . . . , vol. 7, pt. 2, 1854, pp. 817-819; Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, pp. 191-192.

Snout very elongate, pointed, its length three times diameter of eye, flat at end and prominent; rostral scarcely visible above; internasals elongate, a little shorter than elongate prefrontals; frontal narrower than supraoculars, nearly twice as long as broad, subequal in length to prefrontals and parietals; loreal absent; nasal single, very small; prefrontal contacts two or three labials, not entering eye; preocular one, not reaching frontal; postoculars one or two; temporals large, 1 + 2; supralabials nine or ten, usually the fourth, fifth and sixth (fifth, sixth and seventh) enter the eye; four infralabials border anterior chinshields, which are but little more than half size of posterior pair. Scales in 17 rows, the dorsals feebly keeled. Ventrals 198-217; anal divided; subcaudals 139-165.

Bright green above, yellowish green below and on upper lip; a yellowish white line along each side of venter and in subcaudal area. Reaches a length in excess of one and a half meters.

Ranges from Yucatán, Mexico, into South America.

Oxybelis brevirostris (Cope)

Plate XIII

Dryophis brevirostris Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 555 (type locality, Veragua, Panamá); and Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 132, pl. 26, fig. 2 (southeastern Costa Rica).

Oxybelis caerulescens Jan, Elenco Systematico degli Ofidi, 1863, p. 88.

Oxybelis brevirostris Boulenger, Catalogue of the Snakes in the British Museum, 2nd ed., vol. 3, 1896, p. 190; Andersson, Göteborg Kungl. Veten. Vitt. Samh. Hand., vol. 17, 1914 (1916); Medd. Göteborgs Mus. Zool. Afdel. 9, p. 36 (Siquirres, Costa Rica).

A specimen of this very slender tree snake was captured at Los Diamantes by Richard C. Taylor (No. 366). It agrees with specimens reported by Cope in having the scales almost, if not entirely, smooth.

Body slender, compressed, rostral visible above; the suture between rostral and internasals a transverse line; internasals one sixth shorter than prefrontals; length of frontal equals parietal length and also equals its distance from rostral, its width in length at least twice; parietals followed by two greatly enlarged upper secondary temporals, which are separated mesially by a smaller scale; nostril in single elongate nasal; no loreal; a large preocular touches frontal; supraoculars as long as, but much wider than, frontal; one postocular; temporals 1 + 2, extremely large; supralabials 6-6 in following order of size: 1, 2, 3, 5, 4, 6; infralabials 7-7; two pairs of chinshields, the posterior narrower, but a little longer than the first pair; scale formula 15-15-13, smooth, the vertebral row somewhat enlarged; ventrals 177, subcaudals 162; anal single; total length 872 mm.; tail 348 mm.

Color uniform greenish tending to become purplish or lavender in preservative. I have examined also two specimens from Costa Rica collected by William Gabb (U. S. National Museum Nos. 30559-30560. The ventrals are 178 and 176 respectively; the subcaudals 75 +, 159.

Oxybelis aeneus (Wagler)

Dryinus aeneus Wagler, in Spix, Serpentum Brasiliensium, 1824, p. 12, pl. III (type locality near Ega, Brazil).

Oxybelis aeneus auratus (*part.*) Bogart and Oliver, Bull. Amer. Mus. Nat. Hist., vol. 83, 1945, pp. 381-392.

Oxybelis acuminatus Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, pp. 192-193 (Irazú, Costa Rica).

The status of this name for this form is somewhat uncertain. Presumably following Schmidt's suggestion (Field Mus. Nat. Hist. Zool. Ser., vol. 24) Bogert and Oliver, *loc. cit.*, combine several recognized species into a single "species" extending from Arizona to

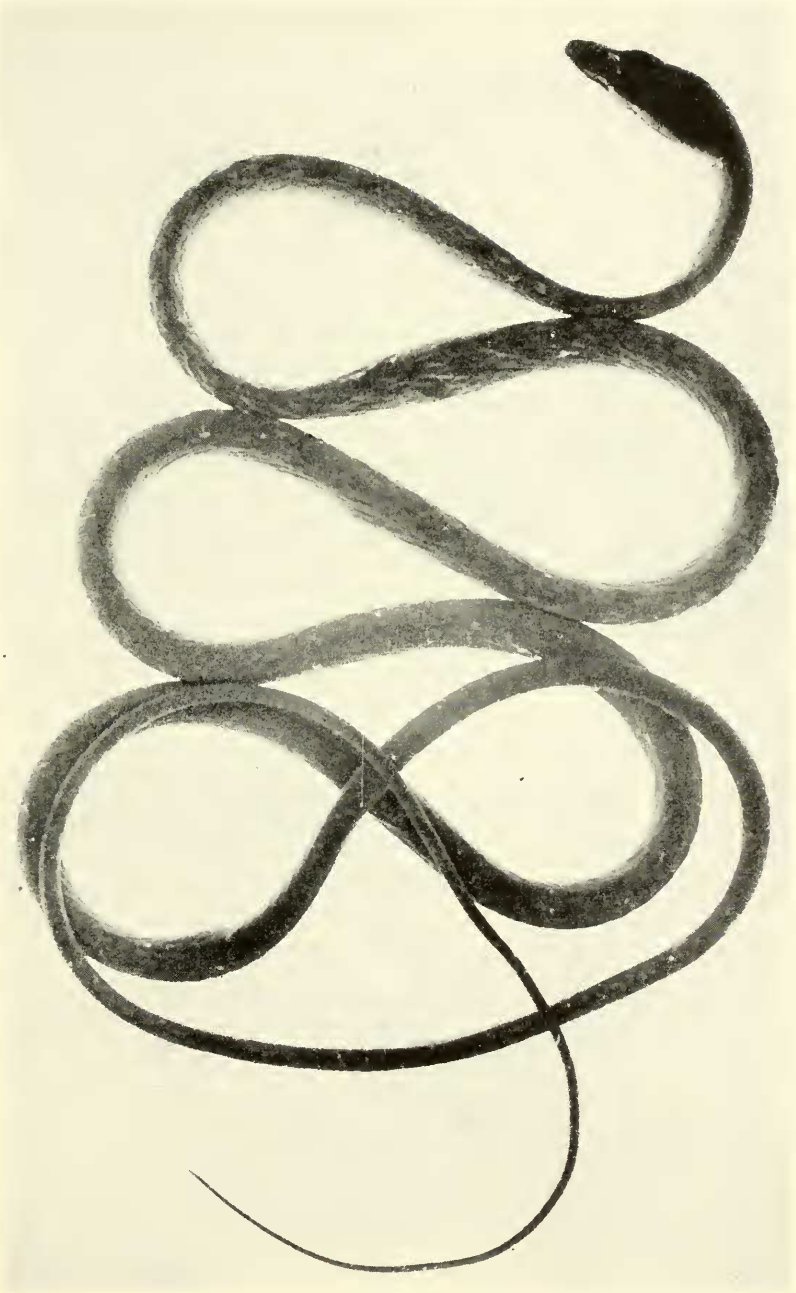


PLATE XIII. *Oxybelis brevirostris* (Cope), RCT No. 1366, Los Diamantes, Costa Rica, September 4, 1947. Approximately natural size.

Brazil. They state, "Whereas this material is representative it is, of course *quite inadequate* for any satisfactory study of a variable form ranging over large portions of two continents. The conclusions we are able to draw therefore must be considered tentative . . ." They have however shown that the name *aeneus* of Wagler, antedates *acuminatus* of Wied, the name under which this species has long been known.

The following characters will identify this form in Costa Rica: snout narrow, elongate, sharply pointed, the rostral usually not visible from above; snout three to three and one-half times eye diameter; internasals slightly shorter than the prefrontals; frontal long, narrow, the width slightly more than half of length; parietals slightly longer than frontal; nasal slender, small, single; no loreal; prefrontal touching three supralabials; one large preocular; postoculars two; temporals large, 1 + 2; supralabials eight, five and six enter eye; nine infralabials, four in contact with first chinshields.

Scales in 17-17-13 rows, smooth or faintly keeled; ventrals 174-203; subcaudals 150-188; anal divided. Variable in color; green, bronzy, grayish or reddish above, uniform or flecked with brown; a black line on the side of the head; yellowish or brownish on venter, speckled or streaked with brown, often with scattered black dots.

Reported from "Irazu" Costa Rica by Boulenger.

Genus IMANTODES Duméril and Bibron

Imantodes Duméril and Bibron, Mem. Acad. Inst. France, vol. 23, 1853, p. 507.

Genotype: *Coluber cenchoa* Linnaeus.

Three species of the genus occur in Costa Rica.

KEY TO SPECIES OF IMANTODES IN COSTA RICA

1. Scales of the median vertebral row less than twice the width of adjoining scales; ventrals 202, subcaudals 115 ..... *inornatus*
   Scales of median vertebral row twice (or more) as wide as the adjoining scales 2
2. Scales of median row three to four times width of adjoining scales; ventrals 233-252; subcaudals 157-171 ..... *cenchoa semifasciatus*
   Scales of median row twice width of adjoining scales; ventrals 220-237; subcaudals 114-146 ..... *gemmistratus*

Imantodes inornatus Boulenger

Plate XIV

Himantodes inornatus Boulenger, Catalogue of the Snakes in the British Museum (Natural History), vol. 3, 1896, p. 88, pl. 5, fig. 1 (type locality, Hda. Rosa de Jérico, 3250 ft., Nicaragua).

A specimen of this species (M.N.H. No. 25158) was acquired at Isla Bonita (American Cinchona Plantation) on the east slope of Volcán Poás.

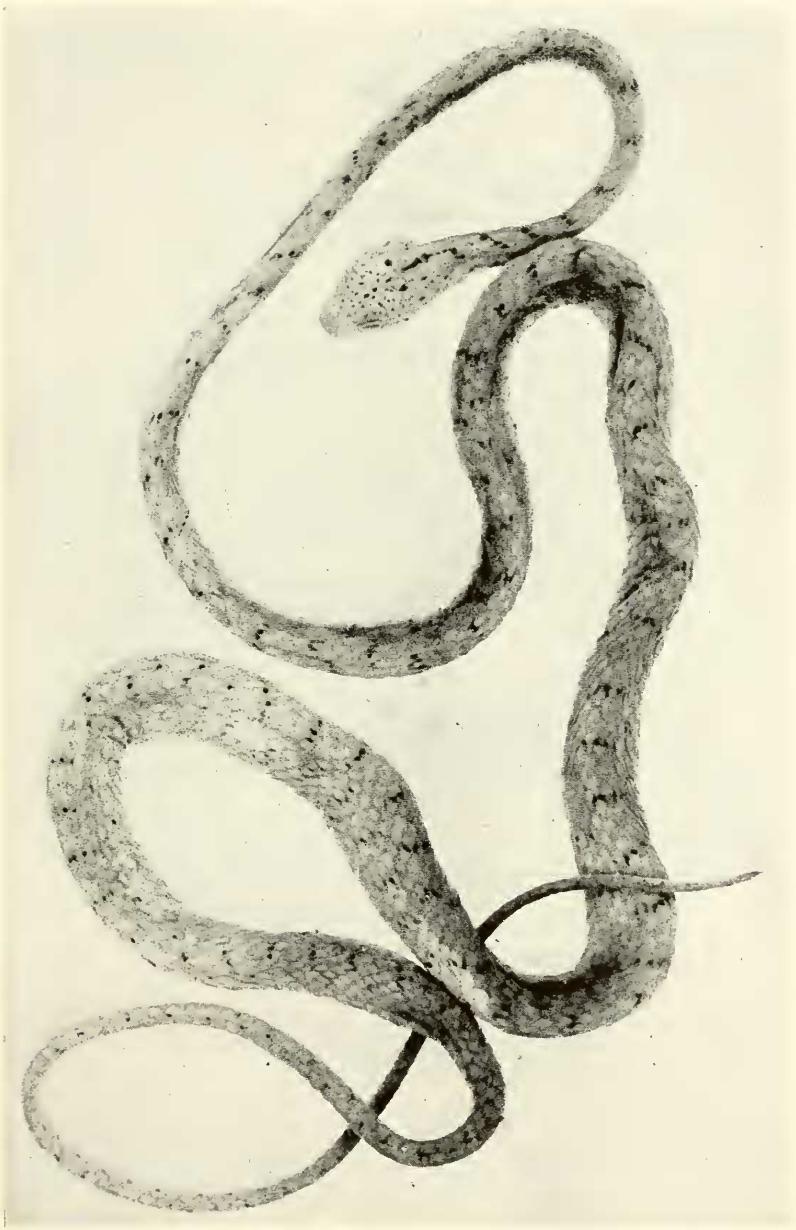


PLATE XIV. *Imantodes inornatus*, MNH No. 25158, Isla Bonita, Costa Rica, about natural size.

Head broad with a very narrow neck; rostral about twice as wide as high, the part visible above forming a very narrow line; internasals large, their length about two thirds that of the prefrontals and about one half of their area; prefrontals minutely wider than long; frontal slightly less than twice as long as wide, narrower than the supraoculars, equal to its distance from snout tip; supraoculars very large, of greater area than frontal, about one-third longer than wide, about one-seventh shorter than parietals; latter scales relatively short, longer than wide, their length equal to their distance to a point little beyond middle of prefrontals; nostril in a single nasal; loreal as long as high; a single preocular, very narrow and high; two postoculars; temporals $1 + 2 + 3$.

Supralabials 8-8, in the following ascending order of size: 1, 2, 4, 3, 8, 5, 6, 7; third, fourth, and fifth supralabials enter orbit; eye very large, equal or minutely less than its distance from the end of snout, the pupil vertical; anterior chinshields a little shorter than posterior; infralabials 9-9, the first six border first pair of chinshields. Scales smooth, the median row slightly, but not abruptly enlarged; scale formula, 17-17-17; ventrals 202; subcaudals, 115; anal divided. Total length, 821 mm.; snout to vent, 586 mm.; tail, 235 mm.

Above fawn with scattered black flecks or dots on head, a pair on the posterior part of the parietals largest; a dim elongate mark on neck behind parietals. Body with indistinct, extremely narrow, darker, transverse markings across the back where they tend to contact the upper points of a zigzag line indicated only by minute black flecks; the markings on tail similar but less distinct. Ventrals with a peppering of black; pigment concentrated so as to form a somewhat darker median line; chin lacking pigment. This specimen agrees in rather remarkable detail with the type description.

A second specimen examined (U. S. N. M. No. 15318) has 204 ventrals and 96 subcaudals. Otherwise it agrees with the type in essential characters.

Imantodes cenchoa semifasciatus Cope

Plate XV

Himantodes semifasciatus Cope, American Nat., 1894, p. 613.
Imantodes cenchoa semifasciata Smith, Proc. U. S. Nat. Mus., vol. 92, 1942, pp. 384-385.

This extremely slender, greatly elongated snake was found usually in trees either under bark or coiled in growing bromelias. Its large eyes suggest that it is of nocturnal habits. The specimens were extremely gentle, moving with great deliberation and allowing themselves to be handled without showing fear.

Of the six specimens of this species that I have at hand, the three

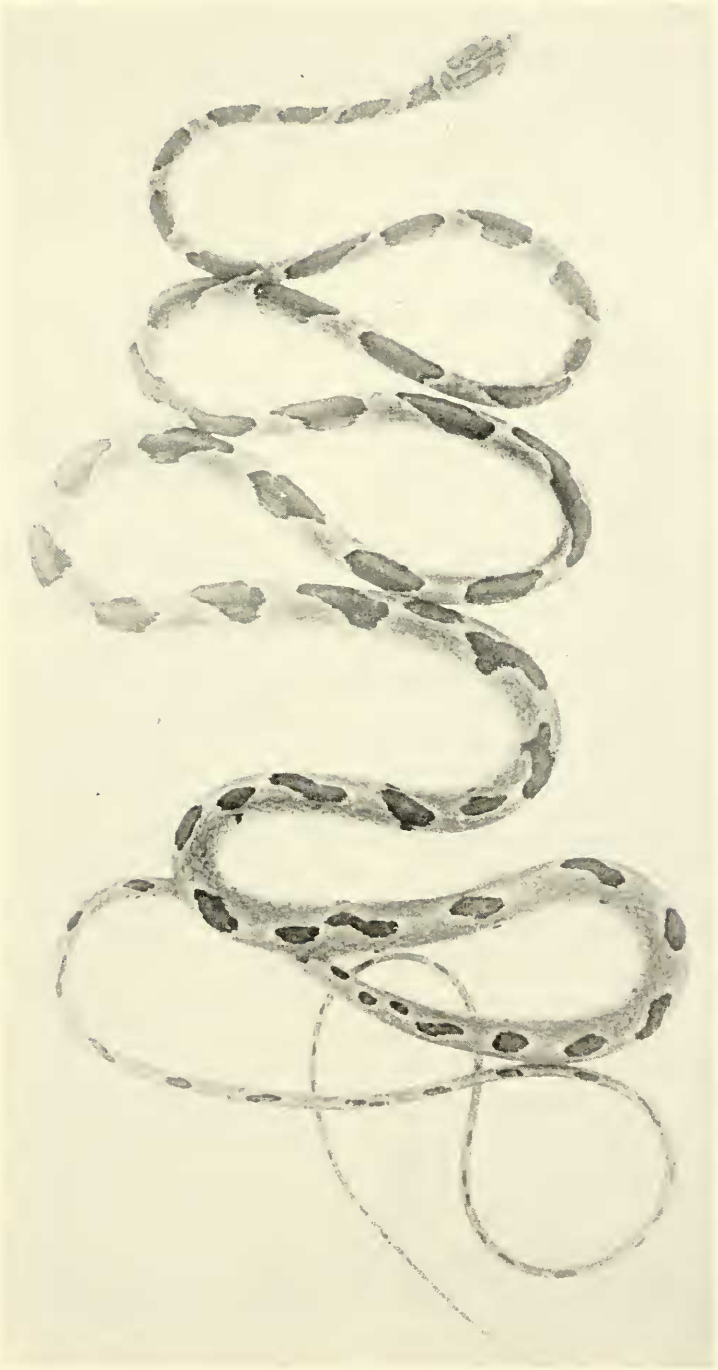


PLATE XV. *Imantodes cenchoa semifasciata* RCT No. 1370, Los Diamantes, Costa Rica. September 1-8, 1947; about natural size.

from rather high elevation (5-6000 ft. elev.) do not offer constant differences from those taken in lowlands (800 to 900 ft.).

R. C. T. Nos. 644, 829, 830 are from the region about Turrialba. R. C. T. No. 1370, M. N. H. Nos. 25700 and 25680 are from Los Diamantes, 1 mi. south of Gúapiles.

There is no variation in the number of the supralabials, the fourth and fifth enter the orbit in all. Five is the normal number of infralabials touching the first chinshields, six occuring two times in twelve. The temporals however are irregular; formulae such as $3+3+4$, $2+2+3$, $2+2+4$, $2+3+3$, $\frac{1+2}{1}$, $3+3$, $4+4$, and $1+2+3$ occur.

Males are characterized by tubercles on the chinshields and occasionally on adjoining infralabial scales. Sometimes the second pair of chinshields is separated by one or more small scales; sometimes they are together.

The spots over the anterior part of the body tend to reach the ventrals, but all do not. Practically all spots are brown narrowly bordered by blackish brown and this color is in turn bordered by scales that are cream, and lacking pigment for the most part. There may be a few irregular black spots on sides near the edges of the ventrals, opposite the main spots or possibly alternating with them.

This species may readily be diagnosed by the following characters in addition to those given: head two to three times as wide as the narrowest point of neck; eye very large, nearly equal to its distance from the tip of snout; a small loreal present; scales smooth without apparent apical pits, the scales of the median row somewhat quadrangular, three to four times the width of adjoining row; the scale formula is 17-17-17.

I have examined four specimens in the U. S. National Museum from "Costa Rica". The number of spots varies from 42-47 on body.

There are two specimens, Nos. 15309, Zent, Costa Rica and 19338 from Suretka, C. R., in the Harvard M.C.Z.

The species is known from numerous localities in Costa Rica where it is called Bejuquilla. The name, however, is doubtless also applied at times to other slender snakes.

DATA ON IMANTODES CENCHOA SEMIFASCIATUS

No.	Sex	Supra-labials	Infra-labials	Pre-ocular	Post-ocular	Ventrals	Sub-caudals	Anal	Body spots
644	♀	8–8	9–10	1–1	2–2	246	...	1	43
829	♂	8–8	10–10	1–1	2–2	252	166	2	48
830	♂	8–8	11–12	1–1	2–3	252	91+	2	49
1370	♂	8–8	10–10	1–1	2–2	249	168	2	48
25700	♂	8–8	10–10	1–1	3–3	248	171	2	..
25680	♀	8–8	9–10	1–1	2–2	233	157	2	..

Imantodes gemmistratus Cope

Himantodes cenchoa Cope (*nec* Linnaeus), Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 264 (near Isalco, San Salvador).

Himantodes gemmistratus Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 13, 1861, pp. 296-297 (type locality, near Izalco, Salvador).

Imantodes gemmistratus Smith, Proc. U. S. Nat. Mus., 1942, vol. 92, pp. 385-386 (Chiapas, Nicaragua, Costa Rica, Panamá).

This form, *fide* Smith, is characterized by having most of the median dorsal scales twice the width of the adjoining row. Usually three labials border the orbit; one preocular, two postoculars; ventrals 220-237; subcaudals 114-146.

The bands across body are about 42 in number, usually complete throughout the length of the body.

Cope's type specimen is described as: head short, thick, the temporal regions swollen; scales of the median dorsal series diamond-shaped, longer than broad; one temporal in contact with the postoculars; sixth infralabial largest; the spots on body 42, tending to be connected by a median dorsal vitta; head pale brown, with a few irregular spots; a single apical pit in each scale.

Genus CLELIA Fitzinger

Clelia Fitzinger, Neue Classification der Reptilien, 1826, p. 56.

Genotype: *Clelia daudinii* Fitzinger, substitute name for *Coluber clelia* Daudin.

Two species are known from Costa Rica.

KEY TO THE SPECIES OF CLELIA IN COSTA RICA

Scale rows 17-17-17(15); supralabials 7 (8); juvenile coloration: head and neck black with a nuchal light band several scales wide; body reddish, each scale with a black dot. Adults blackish ..... *clelia clelia*

Scale rows 19-19-17; labials 8, 9; juvenile coloration: black with a series of red transverse bands, complete or broken, three or four scales wide ..... *petalarius*

Clelia clelia clelia (Daudin)

Plate XVI

Coluber clelia Daudin, Histoire Naturelle Générale et Particulière des Reptiles, vol. 6, Year 11 (1803), pp. 330-331, pl. 78 (type locality, Surinam).

Clelia clelia clelia Smith, Proc. U. S. Nat. Mus., vol. 92, 1942, p. 394; vol. 93, 1943, pp. 402-403.

Three specimens of this widespread species were taken, as follows: R.C.T. No. 636 (yg.), 4 mi. E of Isla Bonita at an elevation of about 3600 feet, and M.N.H. No. 25746 (yg.) about 5 miles west-southwest of Isla Bonita at an elevation of about 6300 feet, Aug. 3, 1947. A third adult specimen, M.N.H. No. 25747, was taken at Isla

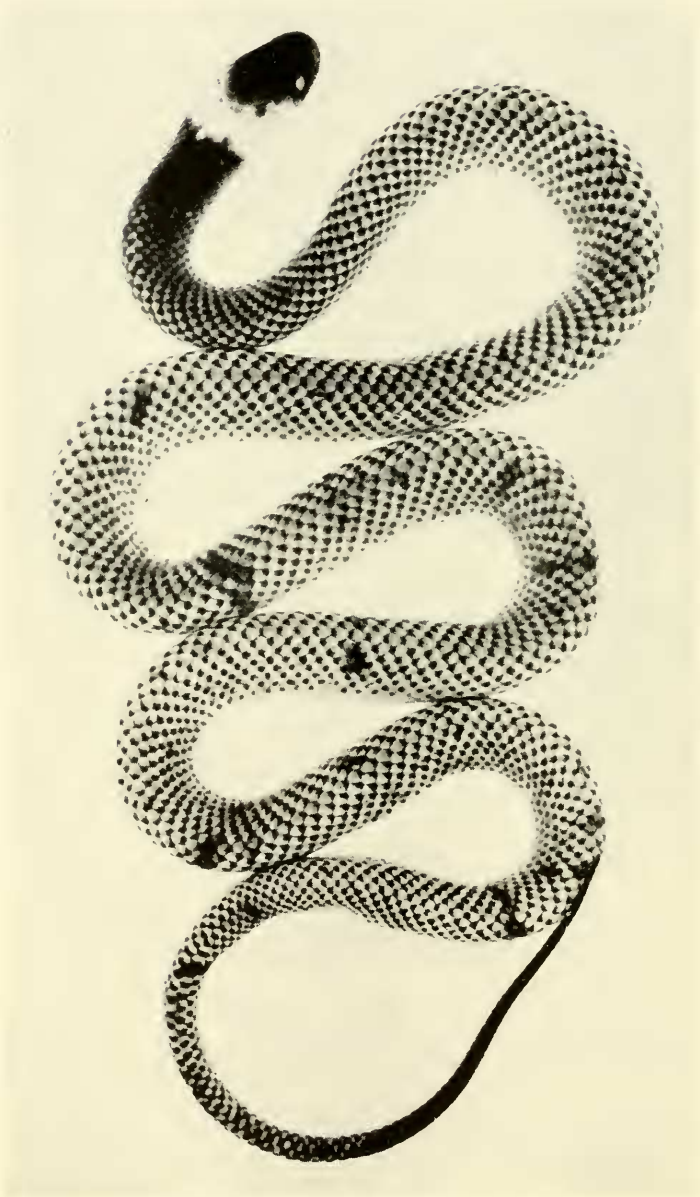


PLATE XVI. *Clelia clelia clelia* (Daudin), MNH No. 25746, 5 miles west Isla Bonita, Costa Rica; approximately natural size.

Bonita on the highway, elevation about 5400 feet. The specimens differ considerably in the character of the marking on the body.

No. 25746: In this specimen the characteristics are as follows: top and sides of head, including parietals, postoculars, and four anterior supralabials brownish black; a cream band on anterior nuchal scales and temporals, with clouding on some of the temporals and on scales touching posterior edge of parietals; width of this band equal to width of four scale-rows; a dorsal blackish spot eight or nine scales wide on neck, which, on its anterior part, reaches to ventrals but posteriorly only to fourth scale row; general color above pinkish; on ventral surfaces cream white; body scales with a blackish area on posterior part of each scale, except outer row less regularly spotted; tail blackish toward tip, ventrals immaculate save for an occasional fleck on outer edges of the scales. Careful scrutiny of body shows a suggestion of bands in a few groups of black flecks on dorsum and sides.

No. 636: The general coloration follows the preceding with the following exceptions. The color above pinkish, the edges of the scales usually darker than centers, there being more pigment on dorsal areas, less on sides; no distinct black spot on each scale; on outer scale row and outer edge of ventrals dim grayish marking suggesting a discontinuous irregular grayish line.

No. 25747, an adult, is blue black, the color extending onto ventrals on each side for one fourth of their width throughout greater part of length. Middle half of ventrals immaculate cream-white with a rosy tinge; chin and infralabials light; supralabials a little lighter than head.

The following scale characters are the same in all the specimens: Supralabials 7-7, the third and fourth entering eye; infralabials 8-8, the first five bordering first chinshields. The temporals, however, are variable. The formulae follow: No. 636, $2 + \frac{1}{2+2}$, $2 + 2 + 3$; No. 25746, $2 + \frac{1}{2+2}$; No. 25747, $2 + 3$.

The following table gives further scale variation:

DATA ON CLELIA CLELIA CLELIA DAUDIN

No.	Sex	Ventrals	Caudals	Scale formula
636	♂	209	82	17–17–15
25746	♀	222	71	17–17–17
25747	♀	228	61	17–17–17

Clelia petolarius (Linnaeus)

Plate XVII

Coluber petolarius Linnaeus, Museum Adolphus Friderici Regis, 1754, p. 35, pl. ix, fig. 2; and Systema Naturae, 1766, 1, p. 387.

Oxyrhopus petolarius Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, pp. 101-103; Cope, Journ. Acad. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 132 (Sipurio, Costa Rica).

A single Costa Rican specimen is at hand, collected on the Pacific slope at San Isidro El General (R.C.T. No. 969).

Rostral narrowly visible, its width a little greater than its height; internasals small, about one third area of prefrontals which are very nearly as broad as long; frontal subtriangular, its length about one-sixth longer than wide, and equal to its distance from the middle of the prefrontals, much more than twice as wide as the supraoculars; length of parietal about equal to its distance from the internasal; nostril between two nasals; loreal elongate, nearly twice as long as high; one preocular touching frontal; two postoculars; temporals 2 + 3; supralabials 8-8, the fourth and fifth enter orbit; infralabials 10-10, five touching first pair of chinshields, which are a little larger but about same length as posterior pair; scale formula: 24 (about head) -19-19-17, with paired apical pits. Ventrals 201; subcaudals 79 + 1.

Color above blackish; an occipital reddish band covering extreme tips of parietals and the following four scale rows; this in turn followed by a broad black collar, eleven scales wide; behind this 29 orange-red bands, most of which are continuous across back, but nine or ten separated mesially tending to alternate on opposite sides; ten transverse bands on tail most of which are continuous; red bands are two to three scale rows wide, the intervening black bands six to eight scale rows wide posteriorly (anteriorly, four to five). The belly and chin white; subcaudal region grayish to black, the red bands encircling the tail. The reddish orange bands have the scale edges darkened, occasionally spotted.

The specimen was caught under a small log, about a half mile west of San Isidro El General on the Pacific side of Costa Rica, by Richard C. Taylor.

A specimen in the U. S. National Museum listed by Cope, *op. cit.*, has been examined. There are 202 ventrals and 92 subcaudals in this specimen; scale rows 21-19-19-17; one preocular; two postoculars; temporals 2 + 3; supralabials 8-8; infralabials 10-10; loreal 2½ times as long as wide; anterior chinshields double area of second pair. There are 25 light bands on body.

PLATE XVII. *Clelia petolarius* (Linnaeus), RCT No. 969, San Isidro El General, Costa Rica, August 27, 1947; about natural size.

Genus ERYTHROLAMPRUS Boie

Erythrolamprus Boie, Isis, vol. 19, 1826, p. 981.
Erythrolamprus Wagler, Natürliches System der Amphibien, 1830, p. 187 (*part.*).

Genotype: *Erythrolamprus agilis* Wagler (*fide* Fitzinger).
A single form is known to occur in Costa Rica.

Erythrolamprus bizonus Jan

Erythrolamprus aesculapii bizona Jan, Arch. Zool. Anat. Fis., vol. 2, fasc. 2, 1863, pp. 314-315 (Bahia, Messico, Popayan, Cayenne, Brasile, Montevideo, Colombia).
Erythrolamprus venustissimus Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875, published as separate), p. 141 (Sipurio, Costa Rica).
Erythrolamprus aesculapii (*part.*) Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, pp. 200-201 (lists a specimen from Irazú, Costa Rica, ventrals 197, subcaudals 50); Picado, Serpientes Venenosas de Costa Rica, 1931, pp. 32-33, fig. 8 (right).

The use of the name *bizonus* for the Costa Rican form of *Erythrolamprus aesculapii* Linnaeus (*E. venustissimus* Wied) is that of Bailey, mentioned in Dunn and Bailey, Bull. Mus. Comp. Zool., Harvard College, vol. 86, no. 1, 1939, p. 12.

Jan has applied this name to a form presumably ranging from Mexico south through Colombia, Cayenne, Brazil and Uruguay. Dunn and Bailey state that, as the original name was somewhat composite, they restrict the name to Colombian specimens with the bands double even on the neck.

I have examined several Costa Rican specimens in the U. S. National Museum and a summary of the scale counts taken is given in the accompanying table. The scale characters are as follows:

The rostral visible above as a narrow triangle; length of common internasal suture about 2½ times in that between prefrontals; frontal about one-fifth longer than its distance to snout tip, nearly as long as parietals; nasal partially divided, the suture above nostril; loreal higher than wide; a large preocular; two postoculars; temporals 1+2; seven supralabials, the third and fourth entering orbit; eight or (usually) nine infralabials, four touching the first chinshields, which are longer than second pair; scale formula 15-15-15, scales smooth; ventrals 181-201, subcaudals 49-59.

Color above red with a series of 13-15½ paired black bands encircling body separated by a narrow red band. A black spot on the head involves supraoculars, frontal, and two thirds of the area of parietals. The labials and scales on tip of snout and some scales on back of head with blackish marks.

Total length (of U. S. N. M. No. 13536) 598 mm.; tail 87 mm. (San José, Costa Rica).

TABLE OF SCALE COUNTS FOR COSTA RICAN ERYTHROLAMPRUS BIZONA

No.	Locality	Body triads	Tail triads	Ventrals	Subcaudals	Supralabials	Infralabials
9784	Costa Rica	$13\frac{1}{2}$	$4\frac{1}{2}$	189	53	7–7	9–7
9779	Costa Rica	$15\frac{1}{2}$	4	198	49	7–7	9–9
13536	San José, C. R.	$15\frac{1}{2}$	4	198	56	7–7	8–9
14013	Costa Rica	$15\frac{1}{2}$	4	198	59	7–7	9–9
30677	Sipurio, C. R.	$15\frac{1}{2}$	4	194	58	7–7	9–9
8312*	Costa Rica	15	4	201	57	7–7	9–9

Genus CONIOPHANES Hallowell

Coniophanes, Hallowell, in Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 248.

Genotype: *Coronella fissidens* Günther.

Three Costa Rican species are referred to this genus.

KEY TO COSTA RICAN SPECIES OF CONIOPHANES

1. Scales in 17 rows; upper parts grayish brown; two narrow yellowish lines on each side, one on the first scale row, the other originating from a spot on neck, and continuing on body as a series of almost contiguous dashlike spots ..... *decipiens*
   Scales in 21-25 rows 2
2. Scales in 25 rows; a light stripe beginning on head passing eye and continuing with the dorsolateral light lines of body (rarely interrupted on neck); a black dorsal stripe present, five to seven scales wide; separated from a lateral black stripe three scales and two half scale rows wide, by a cream stripe somewhat less than three scales wide ..... *piceivittis*
   Scales in 21 rows; above brownish, the median dorsal scales each with a small blackish posterior spot; all scales of body slightly darker on edges; a dim lateral line on 4th and 5th scale row, and a light line on sixth row; venter peppered with fine pigment ..... *fissidens punctigularis*

Coniophanes decipiens (Günther)

Tachymenes decipiens Günther, Biologia Centrali-Americana; Reptilia and Batrachia, 1895, p. 163, pl. 53, fig. A (type locality, Irazú, Costa Rica).

Rhadinaea güntheri Dunn, Copeia, 1938, no. 4, p. 198 (substitute name for *decipiens*).

Dunn's reference of this snake with grooved back fangs to the genus *Rhadinaea*, I consider untenable and the substitute name which he proposed after this action, I believe, should be suppressed.

Body slender, the tail about one half length of body (tail mutilated in the type); snout short; internasals short and small; frontal shorter than parietals, but as long as or a little longer than snout; one preocular, one or two postoculars; temporals 1+2, widely separated from the postoculars; the sixth, or fifth and sixth labials forming sutures with the parietal; seven supralabials, third and fourth bordering orbit; scales in 17 rows; ventrals 165-173; grooved posterior fangs present.

Upper parts dark grayish-brown; two narrow yellowish lines on each side, one of which runs on the first row of scales; the other originates from a spot on each side of the neck and is continued as a series of elongate, dashlike spots which are almost contiguous; a

* No. 8312 is in M. C. Z., Harvard. Others in U. S. National Museum.

white spot on the antero-lateral part of the parietal; supralabials blackish brown on upper parts, yellowish on lower parts. Venter uniform yellowish.

If the species is not congeneric with *Coniophanes*, it may be necessary to consider this form under a new generic designation.

Coniophanes piceivittis Cope

Coniophanes piceivittis Cope, Proc. American Philos. Soc., vol. 11, July, 1869 (type locality Chihuitán, Oaxaca); Bailey, Michigan Acad. Sci., Arts, Lett., vol. 24, pt. 2, 1938 (1939), p. 31 (Bebedero, Costa Rica).

This species, so far as I am aware has its place in the list of Costa Rican snakes on the basis of a specimen in Vienna * purporting to come from Bebedero, Costa Rica. Unless further specimens are found it might be well to re-examine this specimen to confirm the identification or to question the origin of the specimen. The point nearest to Bebedero, at which the species is definitely known to occur as recorded by Bailey, is nearly 300 mi. north of Costa Rica in the northern part of Honduras!

A diagnosis of the species is given: scale rows 25; a small "subpreocular"; a broad median stripe and a broad lateral dark stripe four or five scales wide, the dark stripes having sharply defined edges; ventrals, males 158-168, females 160-173; subcaudals, males 82-91, females 78-84; scale formula: 21-23-25-17. Anal ridges present in mature males. Eight supralabials, fourth and fifth entering eye; infralabials 10, six touching chinshields; temporals 1 + 2.

Head with a light stripe through top of eye, continuous with the dorsolateral light lines or interrupted on neck. Labials and chin spotted with dark brown or black; body with a black dorsal stripe five to seven scales wide; a black lateral stripe on either side three and two half scales to five and two half scales wide, separated from the dorsal stripe by a narrow dorsolateral light stripe one and two half scales wide. The lower edge of the lateral dark stripe sharply defined contrasting with the light lower rows; lowest two rows faintly flecked with black; belly nearly immaculate.

Coniophanes fissidens punctigularis Cope

Coniophanes punctigularis Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 248 (type locality, Honduras); Smith, Proc. U. S. Nat. Mus., vol. 91, 1941, pp. 107-109, map, fig. 33.

Coniophanes fissidens fissidens (*part.*), Bailey, Michigan Acad. Sci., Arts Letters, vol. 24, pt. 2, 1938 (1939), pp. 14-23, pl. 1, fig. 4.

Two specimens are in the collection from Costa Rica. The following characters obtain: R.C.T. Nos. 872, 1369; sex, ♀, (yg.);

* Bailey (Pap. Michigan Acad. Sci. Arts Lett., vol. 24, pt. 2, 1938 [1939], p. 31) quotes from notes of E. R. Dunn.

loreal quadrangular; preoculars, 2-1, 1-1; postoculars, 2-2, 2-2; temporals, $1 + 2$, $1 + 2$, $1 + 3 + 3$, $1 + \frac{1}{2}$; supralabials, 8-8, 8-8; labials enter eye, 4-5, 4-5; 4-5, 4-5; infralabials, 10-9, 10-9; infralabials touch chinshields, 5-4, 5-5; scale formulae, 21-21-17, 22-21-17. Ventrals 120, 123; subcaudals 46 +, 69; anals, 2, 2.

Color markings very distinct in the young No. 1369 from Los Diamantes, Costa Rica. Above brownish, the median scale row with a black spot in posterior part of each scale so as to simulate a median discontinuous dark line; all scales with slightly darker edges so that a fine, but distinct reticulated pattern is evident; fourth and fifth rows with dark flecks so that a dim lateral or dorsolateral line is evident, the color growing lighter toward ventrals.

Head light brown with some indefinite blackish dots on parietals; labials cream, bordered by a blackish line above; posterior seventh and eighth labials are brown above, the cream covering only their lower fourth (or less); cream area flecked with black; two minute, blackish-bordered, cream ocelli on temporals and a larger one somewhat behind these at same level. At about fifth ventral a black-edged cream line begins on the sixth scale row and continues back. The black border is soon lost and the line can be traced with little difficulty to end of body; chin and entire underside of body light cream peppered with black dots, eight or ten on each ventral; those on outer edge of ventrals largest.

The larger specimen, No. 972, is darker and venter more salmon pink; spot on outer edge of ventrals not larger than the others and may be indistinct or absent; lateral stripe not clearly discernible since all scales are more pigmented; ocelli and light lateral stripe evident, the stripe being only on anterior part of body.

The larger specimen was killed by Richard C. Taylor near San Isidro El General with the same shot that also killed a specimen of *Dryadophis melanolomus alternatus*. Only a single snake had been seen, and consequently there is no data on the behavior of the two species or known reason for the two specimens being so closely approximated.

A specimen in the U. S. National Museum has 115 ventrals and 70 subcaudals.

Known variation in ventrals and subcaudal counts are: ♂ 114-119, subcaudals 70-80; ♀ 121-127, 63-75.

Bailey, *loc. cit.*, has reported the species from the following localities in Costa Rica: Siquirres; El General, Surubres, Suretka, and Palmilla.

Genus RHINOBOTHRYUM Wagler

Rhinobothryum Wagler, Natürliches System der Amphibien, 1830, p. 186.

Genotype: *Rhinobothryum macrorhinum* Wagler.
Only one species is known from Costa Rica.

Rhinobothryum bovallii Andersson

Rhinobothrium bovallii Andersson, Medd. Göteborgs Mus. Zool. Afdel., 9 (Göteborgs Kungl. Vetensk. Vitt. Semh.) Band 17, 1914 (1916), pp. 32-33 (type locality, Siquirres, Costa Rica).

Rhinobothryum bovallii Dunn and Bailey, Bull. Mus. Comp. Zool., Harvard Coll., vol. 86, 1939, pp. 16-17 (Limón, Costa Rica, and localities in Panamá).

This rare back-fanged snake with grooved teeth may be distinguished by the following characters: rostral large, wedged in between internasals, the portion visible above shorter than its distance from frontal; latter broader than long, much shorter than parietals, much shorter than its distance from tip of snout; loreal longer than high; one preocular, not reaching to upper surface of head; two postoculars; temporals, 2-2; eight supralabials, the fourth and fifth bordering eye; fifth to seventh much higher than others; ten infralabials, four or five touching the anterior chinshields; posterior chinshields about half area of first and separated by two scales, nearly equal to anterior in length; scales in 21 rows, smooth anteriorly, keeled posteriorly on back and on tail; on sides the five outer scale rows are smooth; ventrals 240-246, notched and distinctly angular laterally; anal single; subcaudals (divided) 115. Two posterior teeth of maxilla enlarged, grooved.

Top of head black, the scales outlined with yellow margins, the sides white (red) each scale with a dark spot; a narrow light band on back of head followed by a dark band 12 scales long, not crossing throat; body banded with black or blackish brown and red bands, separated from each other by narrow white bands; in middle of body the red bands cover six or seven up to nine or ten scale-lengths, the dark bands six and the white only two scale-lengths. Red scales all tipped with black; on belly, red becomes white and the dark and white alternate; posterior ventrals have dark spots in areas corresponding to the red color. Five black bands on tail as broad as the red intervening bands. Length 1190 mm.; tail 290 mm.

The species is known from Limón and Siquirres, Costa Rica. I have examined a specimen (Harvard M.C.Z. No. 42790 from Esperanza Ridge, Panamá.

Genus CONOPHIS Peters

Conophis Peters, Monatsb. Akad. Wiss. Berlin, 1860, p. 519.

Genotype: *Conophis vittatus* Peters.

Two species have been reported from Costa Rica. They may be differentiated by the following key.

KEY TO COSTA RICAN SPECIES OF CONOPHIS

Upper labials immaculate; head light with three broad brown stripes; body light, with brown stripes..... *lineatus dunni*

Upper labials with black borders; head black with two white lines; body blackish with two white lines on each side... ..... *nevermanni*

Conophis lineatus dunni Smith

Conophis lineatus Cope (*nec* Duméril and Bibron), U. S. Nat. Mus. Bull., 32, 1887, p. 77 (San José, Costa Rica); Dunn, Copeia, 1937, no. 4, p. 214 (Barranca, Tivives, Esparta, San José and Cartago).

Conophis lineatus similis Smith (*nec* Bocourt), Journ. Washington Acad. Sci., vol. 31, no. 3, Mar. 15, 1941, pp. 123-124.

Conophis lineatus dunni Smith, Proc. U. S. Nat. Mus., vol. 92, 1942, p. 395. (Managua, Nicaragua.)

I have examined a paratype of this form from Esparta, Costa Rica.

Snout projecting, part of rostral visible above, one third to one half its distance from rostral; frontal approximately as long as wide, a little longer than its distance from tip of snout; approximately as long as the parietals; one preocular, not touching frontal; two postoculars; loreal present; temporals 2 + 2; supralabials 8 (7), the fourth and fifth enter eye; infralabials 8-8 to 10-11; temporals 2 + 2 + 3; scale rows 19-19-17; ventrals 169-174; subcaudals 64 ♂, 67-69 ♀.

Chin and labial borders heavily pigmented; a dark stripe along first scale row; lateral dark stripe, passing through eye, restricted to the third and fourth scale rows throughout the length of the body and of solid color (without a broad light median area between the two dark edges); a dark stripe on seventh (or sixth posteriorly) scale rows; no secondary dark stripes on either paravertebral rows or those adjacent to them laterally; second scale row white anteriorly; posteriorly with a dotted secondary line; ends of ventrals pigmented in some parts of body.

Conophis nevermanni Dunn

Conophis nevermanni Dunn, Copeia, 1937, no. 4, pp. 214-215 (type locality, Río Poás de Aserri, Costa Rica).

The type description gives the following data: Scutation similar to *Conophis lineatus*. Scale rows 19-17, smooth, lacking apical pits; nasal divided; preocular one, postoculars two; temporals 2 + 2;

supralabials eight, the fourth and fifth border orbit; infralabials 9 or 10, five touching anterior chinshields; ventrals 179-184 (182 + 2); subcaudals 70.

Black on back and sides, light on venter; a light line from snout continues on sixth scale row; a similar line on second scale row; upper labials edged with black.

Maximum known size, 820 mm.

Reported from type locality and possibly from Bebedero, Costa Rica (see Dunn, *loc. cit.*). The type locality is said to be "a few miles south of San José."

Genus STENORRHINA Duméril

Stenorrhina Duméril, Mém. Acad. Inst. France, vol. 23, 1853, p. 490.

Genotype: *Stenorrhina ventralis* Duméril.

The snakes of this genus may be readily distinguished from other snakes by the fusion of the anterior nasal with the internasal scale.

The material that I have studied leaves some doubt as to the number of recognizable forms of this genus that occurs in Costa Rica. This genus is in need of revision and I believe that Dr. J. Bailey has such a revision under way.

At least three forms appear to be present, which may be distinguished by the following key.

KEY TO FORMS OF STENORRHINA IN COSTA RICA

1. Belly strongly pigmented, each ventral scale with a darker transverse band ..... *d. degenhardtii*
   Belly immaculate cream-white without or with slight trace of pigment; a black temporal stripe present or indicated 2
2. Five lines on body more or less distinct ..... *f. freminvillii*
   No lines on body, scales dark or blackish on bases ..... *d. apiata*

Stenorrhina degenhardtii degenhardtii (Berthold)

Calamaria degenhardtii Berthold, Abhand. Gesell. Wiss. Göttingen, vol. 3, 1846, p. 8, pl. 1, fig. 2, 4 (type locality, Mexico and Central America).

Stenorhina degenhardtii Jan, Arch. Zool. Anat. Fis., vol. 2, 1862, p. 63; Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, pp. 229-230.

Stenorhina ventralis Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875) p. 141 (Old Harbor, Costa Rica).

Maxillary teeth 15-17, anterior ones small, equal, separated from two enlarged posterior teeth with a groove on outer side. Head not distinct from neck; nostrils between two nasals, the anterior of which is fused with internasals; snout obtusely pointed; rostral broader than deep, the part visible above measuring one half to two thirds of its distance from frontal (rarely equal); internasals about as long as prefrontals or a little shorter; frontal one and one-third to one and one-half times as long as wide, as long as or a little

longer than its distance from snout tip; as long as or a little shorter than parietals; loreal present or absent, if present small; when absent fused to an adjoining scale; prefrontals often touching labials; one preoculars, two postoculars; temporals 1+2, 2+3, or 2+4; seven supralabials, third and fourth enter eye; seven or eight infralabials, three or rarely four labials touching first pair of chinshields, which are longer than posterior pair. Scales in 17-17-17 smooth rows without apical pits; ventrals 158-171; subcaudals 33-36; anal divided; length 750 mm.; tail 100 mm.

A Costa Rican specimen has upper parts brown with more or less distinct darker spots and irregular crossbars; belly more or less black spotted. In one specimen there are no well-defined markings.

Two Costa Rican specimens (Nos. 32582-83) collected by William Gabb are in the U. S. National Museum collection. Both are now very soft but the dark ventral coloration is distinct in both. No. 32582 has 159 ventrals, 33 subcaudals.

Stenorrhina degenhardtii apiata Cope

Stenorhina d[egenhardtii] apiata Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 142 (El Barrio, Oaxaca).

This subspecies is included in the Fauna of Costa Rica on the basis of a specimen in the U. S. National Museum (No. 9774) collected by Zeledón in "Costa Rica," no specific locality known.

The general characters of this form are as follows: rostral large, more than half its surface visible from above, equal to about three fourths its distance from frontal; internasal fused with the nasal; posterior part of the combined scale elongated; frontal six-sided, elongate; nearly a third longer than its distance from snout tip; a large preocular, 1½ times as high as long; two postoculars; temporals 1-2; 7-7 supralabials, the third and fourth enter orbit; first chinshields larger than second, and tending to separate the second pair for some distance; scale rows 17-17-17, the count around posterior part of head, 24; ventrals 174, subcaudals 36.

The specimen is nearly uniformly colored, each scale with a darker basal spot or area; belly immaculate cream; labials cream except for a black line that crosses side of head.

Stenorrhina freminvillii freminvillii Duméril, Bibron and Duméril

Stenorhina freminvillii Duméril, Bibron and Duméril, Erpétologie Générale, vol. 7, pt. 2, 1854, pp. 868-869, pl. 70, fig. 1, 2 (Mexico).

Stenorrhina freminvillii freminvillii Smith, Proc. U. S. Nat. Mus., vol. 93, 1943, p. 472.

A single specimen, Harvard M. C. Z. No. 15294, from Costa Rica is referred to this subspecies.

The part of rostral visible above large; internasal fused to nasal; a small loreal present; one preocular, two postoculars; temporals 1-2; supralabials 7-7; infralabials 7-7, three labials touching the anterior chinshields; second chinshields small, less than half of first; mental very narrow; ventrals 182, subcaudals 38; anal divided; scale rows 17-17-17 without apical pits.

Head brown with some black spotting; labials cream save on their upper edges, which have a dark longitudinal mark. Body brownish with 5 indistinct dotted lines on back; venter immaculate cream.

Genus SCOLECOPHIS Fitzinger

Scolecophis Fitzinger, Systema Reptilium, 1843, p. 25.

Genotype: *Calamaria atrocincta* Schlegel.

A single species is known from Costa Rica.

Scolecophis atrocinctus (Schlegel)

Calamaria atrocinctus Schlegel, Essai sur la Physionomie des Serpents, vol. 2, 1837, p. 47.
Scolecophis atrocinctus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 259.
?Pseudoboa petola Picado, Serpientes Venenosas de Costa Rica, 1931, pp. 33-34, fig. 9 (right).

The species has a range extending from Honduras to Costa Rica. I have examined a single male specimen from Costa Rica now in the U. S. National Museum, collected by Zeledón.

Rostral narrowly visible above; internasals small, their length in prefrontal length about 2½ times; frontal distinctly longer than its distance to the end of snout; parietals large, one fourth longer than their distance to snout tip; nasal divided; a small loreal, nearly square; one preocular; two postoculars; temporals 1+1; supralabials 7-7; anterior chinshields twice size of second pair; eye small, its diameter twice in distance to anterior edge of rostral; temporals 1+1+2; ventrals 191; anal divided; subcaudals 53; scales 15-15-15, smooth with a single, very small, apical pit.

Body ringed in black and yellow (white in preservation). On the dorsum the black transverse rings cover 3½ to 4 scale rows, the yellow, 2 to 2½ rows; on venter the white occupies two ventrals, the black three ventrals; head blackish with a band across snout chiefly on the prefrontals, first two labials and the anterior edge of frontals; a triangular white spot from the labials reaching above eye level involving all of fifth and parts of adjoining labials; tip of chin black to the middle of the first chinshields; a small black round spot at the beginning of the throat; first white neck band two scales wide followed by a black band five scales wide; a total of 36 black bands on body, two on head and seven on tail.

The maxillary teeth 14, with two posterior small grooved fangs; eight anterior maxillary teeth grooved laterally (perhaps all maxillary teeth are so grooved since the six following teeth are missing).

Genus TANTILLA Baird and Girard

Tantilla Baird and Girard, Catalogue of North American Reptiles, 1853, p. 132.

Genotype: *Tantilla coronata* Baird and Girard.

Six species are regarded as occurring in Costa Rica. They may be differentiated by the following key.

KEY TO COSTA RICAN SPECIES OF TANTILLA

1. Body reddish brown, with narrow black-bordered cream lines from middorsal line to ventrals, usually alternating; first labials touch or are separated; ventrals 148-155; subcaudals 60-65 ..... *annulata*
   Body not so marked with transverse bars 2
2. Body brownish or reddish; head and part of neck brown followed by a narrow white collar severed medially by a longitudinal median black line; white on venter; nasal separated from preocular or not; ventrals 159-171; subcaudals 44-52 ..... *armillata*
   Body not so marked 3
3. Three longitudinal black-edged strips on body; frontal pentagonal; first pair of lower labials separated (rarely touch) bringing mental and first chinshields together; chestnut brown, the scales darker on edges; a pale collar across back of head; ventrals 148; subcaudals 67 ..... *reticulata*
   Not so marked 4
4. Nasal undivided (rarely partly divided); ventrals 180; subcaudals 71; grayish above with a white collar; two black-edged dorsal brown stripes and one lateral run length of body; sometimes a dark line on each side of venter; below white, ... *virgata*
5. Only a single pair of chinshields; first infralabials in contact; ventrals 146; subcaudals?; light brown above, yellow below; a median brownish stripe and a narrow yellow stripe on adjacent borders of the third and fourth scale rows, bounded above by a single dark brown row, and below by several rows with dark centers; black spot below eye ..... *ruficeps*
   Two pairs of chinshields; first lower labials separated; ventrals 121-135; subcaudals 38; above grayish brown, with an indistinct lighter collar across parietals; no white spots on head ..... *shistosa*

Tantilla annulata Boettger

Plate XVIII

Tantilla annulata Boettger, Zool. Anz., 1892, p. 419 (type locality, Nicaragua); Dunn, Proc. Acad. Nat. Sci. Philadelphia, vol. 92, 1940, p. 119; Dunn and Bailey, Bull. Mus. Comp. Zool. Harvard Coll., vol. 86, Oct. 1939, p. 19 (between Peralta and Turrialba, Costa Rica).

Tantilla semicinctum Barbour and Amaral, Bull. Antiv. Inst. Amer., vol. 1, no. 4, 1928, p. 100 (*fide* Dunn) (Not of Duméril, Bibron and Duméril).

Homalocranium annulatum Günther, Biologia Centrali-Americana, 1895, p. 150 (description of type specimen); Boulenger, Catalogue of the Snakes in the British Museum, ed. 2, 1896, p. 217; Werner, Mitt. Naturh. Mus. Hamburg, Jahrg. 26, 1909, pp. 238-239, fig. 11.

A single specimen (M.N.H. No. 25705) of this rare form was obtained at Turrialba, July 17, 1947. Its characters are given in detail since it differs from the type in certain points.

Rostral distinctly wider than high, part visible above as wide as an internasal, angular posteriorly; internasals half as long as prefrontals; frontal hexagonal, about one-sixth longer than wide, the

lateral angles extremely obtuse, its length about one fourth greater than its distance from tip of snout, its width less than twice that of

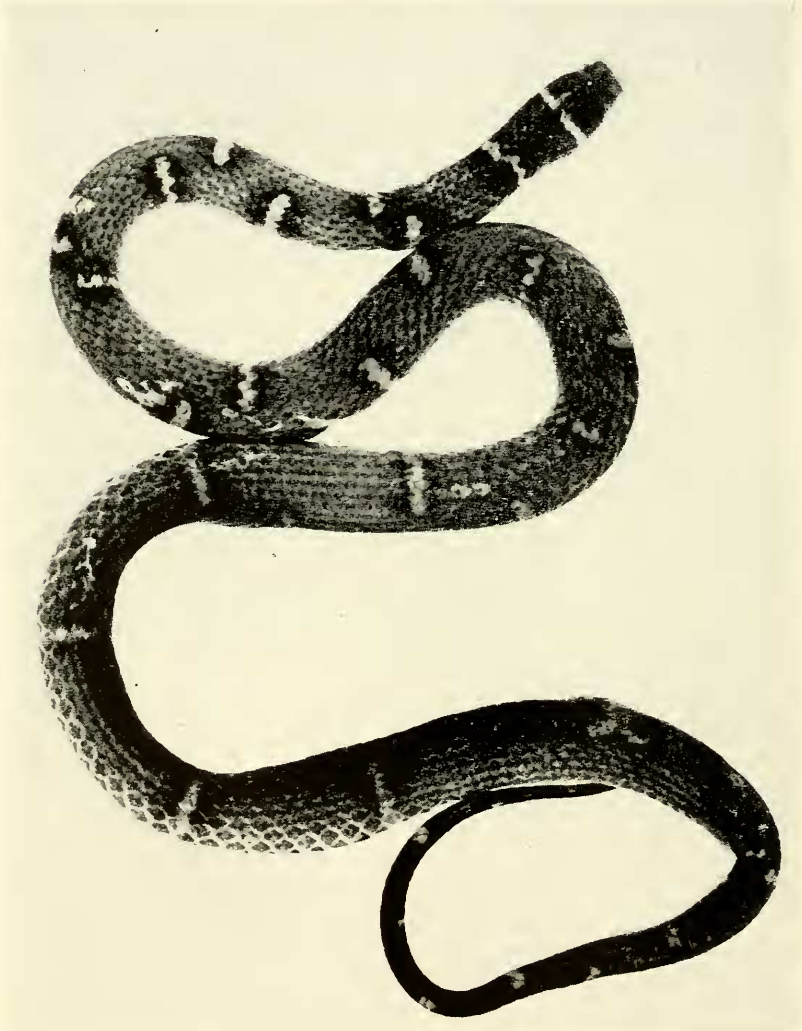


PLATE XVIII. *Tantilla annulata* Boettger, MNH No. 25705, Turrialba, Costa Rica, July 17, 1947; 502 mm.

posterior ends of supraoculars; parietals large, their length very slightly less than their distance from tip of snout; nostril between two nasals, which are narrowed at point of mutual contact, the posterior smaller, in contact with the preocular; no loreal; one

preocular; two postoculars, the lower smaller; temporals 1 + 1 + 1 (on left side the two posterior are partially fused); supralabials, 7-7, in the following order of size: 1, 3, 2, 5, 4, 6, 7; infralabials 6-6, in the following order of size: 2, 6, 1, 3, 5, 4, the first four touch chinshields; first pair of labials separated, leaving the very large mental in contact with first chinshields, which are double the size of the second pair; latter narrowly in contact (in the type the first infralabials are in contact, and the mental is separated from the first chinshields).

Scale formula: 15-15-15, the scales smooth with a single minute pit on most of the dorsal scales, situated some distance in from the posterior median border,* visible under magnification, ventrals, 148, separated from the posterior chinshields by one scale; subcaudals 59 + 1; anal divided.

Snout yellowish white (the rostral somewhat grayish), the color extending to mouth, and posteriorly to middle of prefrontals; this followed by a broad black band, which extends back to posterior tips of parietals, and laterally across upper and lower labials to chinshields; a white spot covering fifth upper and fifth lower labials as well as edges of adjoining scales; remainder of chin white; a narrow yellowish band, one scale wide, crosses extreme posterior parts of parietals and adjoining scale row, interrupted mesially by a single black scale; this band followed by a broad black-brown nuchal band at least six transverse scale-rows wide and bordered behind by another narrow yellowish band; this in turn bordered by a blackish band two scales wide. General body color following this is reddish brown, to brown lower on sides, the median part of each scale slightly darker than the outer parts, thus leaving an impression of very faint longitudinal lines on each scale row (a little more evident posteriorly); a series of yellow vertical blotches the width of a scale length and bordered laterally by black of nearly same width, reach to middorsal line, alternating (usually) with a similar series on opposite side; these yellow and black spots separated usually by eight to ten scales. Dorsal coloration encroaches on ventrals so that outer fourth of ventrals colored like sides; a few scattered dark flecks on median part of ventrals; median part of venter and subcaudal region salmon to coral red; yellow bands tend to widen somewhat low on sides; there are 12 or 13 of these on body, five or six on tail. Maxillary teeth, 20, sub-

* The presence of these minute "pits" has been noted by me in certain other species of *Tantilla*. I am uncertain whether or not these are homologous with the one, two or four "apical" pits that may occur on other snakes.

equal, followed, after a slight diastema, by two smaller grooved fangs; 25-26 mandibular teeth.

Total length, 502 mm.; tail, 108 mm.; snout to vent, 394 mm.; width of head, 10.2.; length of head, 15 mm.; width of body, 11.5 mm.

The above description differs somewhat from the brief description of the type. In that specimen, the markings are confined to the anterior third of the body, and the ventral color is yellow (faded?) instead of red.

From a young specimen described by Dunn (*loc. cit.*), the Costa Rican specimen, while agreeing in the general pattern, differs much in color and in having the first labials separated. In Dunn's specimen the ventrals are 155, subcaudals, 65. There are 13 marks on each side of body; six on tail.

A specimen reported by Werner, *op. cit.*, agrees in much better detail with my specimen, both as regards squamation and color pattern. This specimen is 590 mm. in length; ventrals 149; subcaudals 59 + 1. No locality data are given.

Dunn and Bailey (*loc. cit.*), report a specimen from between Peralta and Turrialba, Costa Rica. This has 151 ventrals; subcaudal count not given (perhaps a defective tail).

Tantilla armillata Cope

Tantilla armillatum Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 143 (type locality, middle Costa Rica).
Tantilla melanocephalum var. Cope, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 205.
Homalocranium armillatum Günther, Biologia Centrali-Americana; Reptilia and Batrachia, 1895, p. 149, pl. 52, fig. C (Cartago, Costa Rica).

Slender, small snake with scales in 15 rows; head flat, depressed; eye less than half the length of the snout; length of prefrontals three times the length of internasals; frontal wide, much shorter than the parietals; one preocular, two postoculars; nasals notched slightly below, the posterior touching the preocular (or narrowly separated from it by the prefrontal); temporals 1 + 1 + 2; seven supralabials, the seventh much the largest; six infralabials, the first pair form a suture behind the mental, first four touch first chinshield, the fourth also touching second pair of chinshields. Ventrals 159-171; anal divided; subcaudals 44-52.

Above chocolate-brown, head and nape for five scales black, with a yellow spot on end of muzzle, one on posterior part of each parietal plate, two on lip behind eye, and one below each nostril; the black is bordered posteriorly by a yellow collar of two scales length, which is also bordered by black behind except where it sends off on the third and fourth rows of scales on each side a

narrow light band which extends to tail. Below this, and also on median scale row, is a narrow line of brown. Below immaculate white; total length as given by Günther, eight and three-fourths inches.

I have examined two Costa Rican specimens of this species as follows: Harvard M.C.Z. No. 15285 from Surubres (Surubreo), Costa Rica has a ventral count of 174, the subcaudals defective. The head and neck, for six scale rows back of parietals, generally black with some cream spots followed by a cream band two scales wide; a discontinuous band forming four spots, one on last labials, one covering parts of back end of parietal and temporal; two small yellow spots on extreme anterior part of parietals; a spot on back edge of rostral and internasals; a spot covering parts of first and second labials, and a spot on fifth labial; venter immaculate, light lateral band present.

A specimen in the U. S. National Museum (No. 9787) from "Costa Rica" has 169 ventrals, 47 subcaudals. The head spotting differs somewhat in detail from that described above; a light stripe follows the third and fourth scale rows to tail; a row of dark dots follows the first scale row.

It may eventually be necessary to regard this form as a subspecies of *Tantilla melanocephala*, but I lack necessary material to establish this.

Tantilla reticulata Cope

T[antilla] reticulata Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 77 (type locality, Coyucas de Veragua, New Grenada).

Rostral broad, visible from above; nasal divided, the nostril chiefly in prenasal; postnasal touching first two supralabials, preocular, internasals, and prefrontals; one preocular, two postoculars; temporals $1 + 1 + 1$; frontal plate broad, angular in front, projecting posteriorly for half its length between parietals; supralabials seven, last largest, third and fourth border the orbit; anterior chinshields touch mental separating first pair infralabials; scales in 15 rows; ventrals 148, anal divided; subcaudals 67.

Color chestnut brown above, much darker posteriorly than anteriorly, the color extending upon the edges of the ventrals; anteriorly the scales have somewhat darkened edges, presenting a reticulated appearance; median dorsal row of scales lighter, forming a pale line which disappears on tail; third and fourth rows on each side lighter, forming indistinct lines; a pale yellow-brown collar crosses posterior parts of parietals; head scales clouded and edged

with darker; a deep brown mark extending from parietals to the mouth across the yellowish labials; on under side pale yellow, deepening posteriorly.

I have examined a specimen from Reventazón (river?), Costa Rica (Harvard M. C. Z. No. 15266). The detail of the color pattern follows: A brown line on first scale row and ventral edge; a cream line covering upper edge of first row and part of second; a brown line covering upper half of second and one half of third; a cream line on upper half of third, fourth and lower half of fifth rows; a brown line on upper half of fifth; a cream line on sixth row; lower part of seventh row dark; a median light stripe on middorsal row and upper part of seventh scale row. The nuchal cream band is interrupted mesially; head dark with a white spot on snout, and one on first labials; a black spot below eye; brown flecks on several of the infralabials; venter immaculate yellow or whitish; ventrals 176; subcaudals 66.

Tantilla virgata (Günther)

Microdromus virgatus Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1873, p. 17, pl. 4, fig. B (type locality, Cartago, Costa Rica, four cotypes).

Homalocranium virgatum Bocourt, Etudes sur les reptiles; Mission Scientifique au Mexique . . . , livr. 9, 1883, p. 584, pl. 36, fig. 4; Günther, Biologia Centrali-Americana, Reptilia and Batrachia, 1895, p. 154, pl. 52, fig. A; Boulenger, Catalogue of the Snakes in the British Museum, vol 3, 1896, p. 223.

Homalocranium sexfasciatum Fischer, Abhandl. d. naturw. Verein, Bremen, Bd. 7, 1882, pp. 225-226, pl. 14, figs. 8-10 (Costa Rica).

Tantilla sexfasciata Cope, Bull. U. S. Nat. Mus. no. 32, 1887, p. 83.

Tantilla virgata Cope, Bull. U. S. Nat. Mus., no. 32, 1887, p. 84.

Nasal usually undivided; rostral just reaching upper surface of snout; internasals a little less than half of the prefrontals; frontal five-sided, longer than broad; parietals as long as their distance to rostral; nasal not or but slightly in contact with preocular; one preocular, two postoculars; seven supralabials, third and fourth border orbit; temporals 1 + 1; first pair of infralabials separated or narrowly in contact; anterior chinshields large; posterior small, scalelike; ventrals 154-175, subcaudals 57-71; scales in 15-15-15 rows; total length 315 mm.; tail 75 mm.

Upper parts grayish or yellowish brown; a white collar present; three or four stripes on each side of body; a pair of brown bands edged with black two scales broad, run from collar to middle of tail; a similar band along each side of body, and sometimes a narrow blackish line along each side of abdomen. Lower parts uniform yellowish white. Upper labials white, with a black spot below eye and on rostral shield.

Known from Cartago, Costa Rica.

Tantilla schistosa (Bocourt)

Homalocranion schistosum Bocourt, Etudes sur les reptiles; Mission scientifique au Mexique et dans l'Amérique Centrale, livr. 9, 1883, p. 584, pl. 36, figs. 10, 10a-10e (type locality, Haute Verapaz, Guatemala).

Tantilla schistosa Cope, U. S. Nat. Mus. Bull., no. 32, 1887, p. 83; Dunn and Bailey, Bull Mus. Comp. Zool., Harvard College, 1939, pp. 5, 19 (Altos de Cangrejal, near San José, C. R.).

A specimen of this Tantilla (M. N. H. No. 25731) was captured along the Reventazón River at Turrialba, under a log where also was obtained a *Micrurus nigrocinctus mosquitensis*. The *Tantilla* was placed in the same container with the *Micrurus*, but on returning to the laboratory, it was missing and was later discovered in the stomach of the *Micrurus*. Digestive fluids have injured the specimen so that accurate identification is impossible. The following miscellaneous characters can be discerned, however, and the species appears to be very close, if not identical, to Bocourt's *schistosa*.

Part of rostral visible above smaller than internasals; latter scales about one half length of prefrontals, which are broader than long; frontal hexagonal, about one-third longer than its distance from end of snout, one-fourth longer than wide, the front border forming a very obtuse angle; parietals about one-fifth longer than their distance from end of snout; scale rows 15-15-15.

The character of the scales on the sides of the head and the lips cannot be determined with certainty; the first pair of labials are separated, the large anterior chinshields touching the mental. A light yellowish band crosses the neck and encroaches on the posterior part of the parietals. Olive above (becoming brown in preservatives), each scale with a lighter center and a darker outer border, thus giving a geometrically reticulated pattern (which is distinct if the specimen is submerged in water). Chin and throat bluish white; anterior one fourth of body dull creamy white gradually becoming, first dimly, then strongly, salmon pink; edges of ventrals lighter; under side of tail uniform salmon pink.

A specimen in Harvard M. C. Z. (No. 15302) is from Altos del Cangrejal, Costa Rica. The following scale characters obtain: ventrals 140; subcaudals 29; one preocular; two postoculars; temporals 1+1; seven upper labials, the third and fourth border orbit; five infralabials, three touching first chinshields. Generally brown above, the scale edges a little darker.

Tantilla ruficeps (Cope)

Poganaspis ruficeps Cope, Proc. Acad. Nat. Sci. Philadelphia, 1894, p. 204 (type locality, Costa Rica).
Tantilla ruficeps Amaral, Mem. Inst. Butantan, vol. 4, 1929, p. 221 (Costa Rica).

Rostral visible from above; frontal rather long, hexagonal; nostril between two nasals, the posterior separated from preocular by prefrontal; one preocular, two postoculars; temporals 1-1; seven supralabials, the third and fourth bordering orbit; first infralabials in contact behind mental; a single pair of chinshields touching four lower labials. Ventrals 146; anal divided.

Light brown above; median dorsal row of scales deep brown; a narrow yellow line on adjacent borders of third and fourth rows of scales which is bounded above by a dark brown line; upper surface of head reddish brown, with a pale spot at end of each parietal shield; upper lip yellow, and a black spot below the eye; lower parts yellow. Length 223 mm.

The species presumably is known from the type specimen only.

FAMILY HYDROPHIIDAE

A single genus representing this marine serpent family has reached the Western Hemisphere. It is distributed along the western coast from California to Chile.

Genus PELAMIS Daudin

Pelamis Daudin, Histoire naturelle . . . des Reptiles, vol. 7, year XI, (?1803), pp. 357-362.

Genotype: *Anguis platura* Linnaeus.

One species is known from the Pacific coastal waters.

Pelamis platurus (Linnaeus)

Hydrus bicolor Schneider, Historiae Amphibiorum naturalis et literariae, Fasc. Primus, 1799, p. 242 (type locality, Pine Island, Pacific Ocean).
Pelamis bicolor Picado, Serpientes venenosas de Costa Rica, 1931, pp. 23-27, fig. 6 (Costa Rica).
Pelamis platurus Gray, Ann. Philos., 1825, p. 15.

This marine serpent, the only species known on the American coasts, has been reported for the Pacific coast of Costa Rica, where it is reputed to be abundant. The high, compressed type of tail is found on no other American snake. This serpent may be recognized by the following characters: upper half of body blackish, lower half dirty white or yellowish, the two separated by a narrow cream line; posterior part of body somewhat spotted; tail yellow with a number of black spots.

The tail strongly compressed into an "oar" about 10 times as high as wide. Scales on median ventral surface of body and tail about

size of dorsal scales. Frontal as long as its distance from tip of snout, nearly equal to a parietal; nostril in nasal directed dorsally; one preocular, two or three postoculars; temporals numerous; seven to nine supralabials, the fourth or fourth and fifth entering orbit. Scales 45-57 about middle of body, smooth in young and females, with one to three tubercles in males. The species reaches a length of three feet.

I have examined the following Costa Rican specimen: U. S. N. M. No. 37490. Some of the characteristics of this specimen are: scale formula, 42-47-49-35; temporals 2+2+3+4; supralabials 9-9; ventrals 295, preceded by 13 scales between chinshields and first distinguishable ventral; 49 subcaudals; 16 dorsal scale rows black; next four cream, remainder dirty white or light tan; spots tend to form dorsal and ventral rows on tail which tend to dovetail with some yellow color between.

U. S. N. M. Nos. 96038, 96040, 96041, Port "Parlear," Costa Rica:

No. 96038. Scale formula, 41-46-47-33; scales with two or three tubercles, sometimes absent on dorsal scales; rostral partly divided by a suture; 8-9 supralabials; ventrals 340; subcaudals 43.

No. 96040. Scale formula, 42-46-47-35; 9-9 supralabials; temportals 2+2+3+4; an elongate subocular; ventrals 320; subcaudals 48.

No. 96041. Scale formula, 42-46-49-37; ventrals 320, subcaudals 41; 7-7 upper labials; 11-11 infralabials; temporals 2+2+3+4; one subocular on one side.

FAMILY ELAPIDAE

Only a single genus, *Micrurus*, is known to occur in Costa Rica.

Genus MICRURUS Wagler

Micrurus Wagler, *in* Spix, Serpentium Brasiliensium . . . , 1825, p. 48.

Genotype: *Micrurus spixi* Wagler.

Four species and six forms are known to occur in Costa Rica. They may be recognized by the following key.

KEY TO FORMS OF MICRURUS IN COSTA RICA

1. Two-color species, black and red (pink or whitish); long, moderately slender snakes; ventrals 269; subcaudals 26; 62 dark black bands on body, four on tail ..... *mipartitus multifasciatus*
   Three-color species, black, yellow (cream), red 2
2. Subcaudals more than 50 (53-58); ventrals 192-199; 13-16 black rings on body; 7-9 on tail; no keeled supra-anals ..... *clarki*
   Subcaudals less than 50 3
3. Seventeen or more black rings on body 4
   Sixteen or less rings on body 5

4. Body slender; 18 body rings, 4 on tail; ventrals ♂ 241; subcaudals 32; keeled supra-anal scales ..... *alleni richardi*
   Body thicker; 22 body rings, 5 or 6 on tail; ventrals ♀ 215; subcaudals ♀ 40 ..... *pachecoi*
5. Black rings 10-12 on body; 3-5 on tail, usually totaling 15; ventrals ♂ 189-193; ♀ 208-210; subcaudals ♂ 47-49; ♀ 35; length 698 mm. *nigrocinctus mosquitensis*
   Black rings 16 on body; 5 on tail; ♂ ventrals 194-204, subcaudals 47-48; ♀ ventrals 214-218; subcaudals 34-36; length 596 mm. ..... *nigrocinctus nigrocinctus*

Micrurus mipartitus multifasciatus (Jan)

Plate XIX

Elaps multifasciatus Jan, Rev. Mag. Zool., 1858, p. 521; Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1872, p. 36; and Biologia Centrali-Americana, Reptilia and Batrachia, 1895, p. 184.

Elaps mipartitus Picado, Serpientes venenosas de Costa Rica, 1931, p. 32 fig. 9 (*non* Duméril, Bibron and Duméril).

Only a single specimen (M.N.H. No. 25187) of this large red and black banded coral snake is in the material at hand. It was found at Turrialba on the I.A.I.A. farm in trash, Aug. 1, 1947. The specimen furnishes the following data: head rather flat, not, or scarcely, distinct from neck; eye diminutive, its greatest diameter (two mm.) about four times in distance from eye to end of snout, and about two and two-tenths times in its distance from edge of upper lip. Rostral broader than deep, part visible from above shorter than internasals; latter scales less than half length of prefrontals; frontal scale narrow but at least one-third wider than supraocular, its length equal to its distance from middle of internasals; parietals large, their length equal to their distance from rostral; nasal divided; loreal longer than wide, bordering eye and forming a broad suture with supraocular; no preocular present; two postoculars; temporals 1 + 1 (1 + 2), the anterior not especially narrow; seven supralabials, third and fourth very high entering orbit, in following ascending order of size: 1, 2, 4, 5, 7, 3, 6; infralabials seven, four normally touching first chinshields, which are a little broader but about same length as second pair (scales on right side of chin region abnormal due to injury).

Scale rows 15-15-15; ventrals, 269; anal divided; subcaudals, 26, the fourth and fifth undivided; 62 dark bands on body, four on tail with extreme tip black, and deflected downward.

Picado (*loc. cit.*,) reports a total length of 1130 mm. for the species.

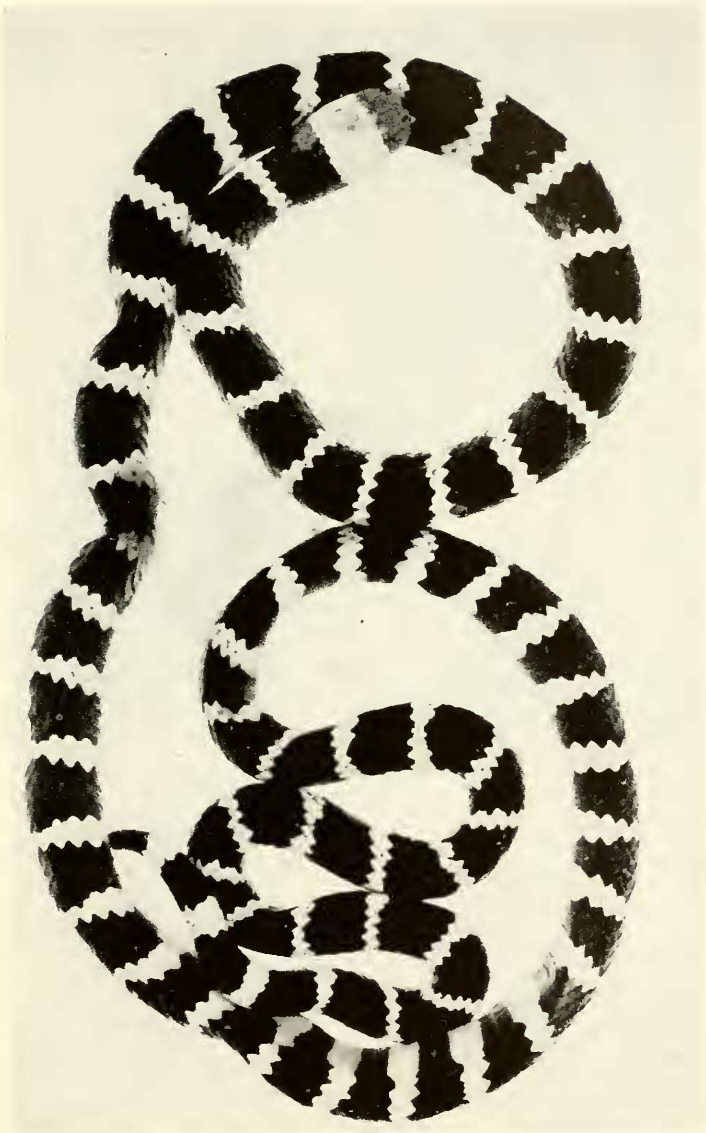


PLATE XIX. *Micrurus mipartitus multifasciatus* (Jan), MNH No. 25187, Turrialba, Costa Rica, August 1, 1947.

Micrurus nigrocinctus nigrocinctus (Girard)

Plate XX

Elaps nigrocinctus Girard, Proc. Acad. Nat. Sci. Philadelphia, 1854, p. 226, and U. S. Naval and Astronomical Expedition, vol. 2, Zoology, 1855, p. 210, pl. 35 (type locality, Taboga Island, Bay of Panamá).

Micrurus nigrocinctus nigrocinctus Schmidt, Smithsonian Misc. Coll., vol. 89, no. 1, Mar. 16, 1933, p. 18 (Panamá localities); Zool. Ser. Field Mus. Nat. Hist., vol. 20, Dec. 11, 1933, p. 33 (Panamá Canal Zone, southwestern Panamá, Pacific slope of Costa Rica, and Nicaragua); Dunn, Notulae Naturae, no. 108, 1942, p. 8 (Boruca, Buenos Ayres, Costa Rica. One of these, Amer. Mus. Nat. Hist. No. 17365, served as a paratype for *n. mosquitensis* Schmidt).

Schmidt gives the following range of scales in a series from Panamá: Ventrals and subcaudals respectively, males 194, 196, 204; 47, 47, 48, with totals 241, 243, 245. For females, 214, 215, 215, 218; 34, 36, 36, 35, with totals 248, 251, 251, 253.

A specimen M. N. H. No. 25190 taken on the Pacific slope of Cerro de la Muerte at Boquete Camp is referred to this species. The ventrals are 207, the subcaudals 55, totaling 262, of which the third to tenth are undivided. There are 16 black bands on the body, and five on the tail.

Scale characters of this specimen are as follows: part of rostral visible above nearly equal in length to median internasal suture, much wider than high; length of internasals equal to two thirds length of prefrontals; latter scales one fifth wider than long, forming an acute angle laterally; *frontal nearly double width of supraoculars which are narrowed posteriorly*, the widest part being near the anterior end; eye very small, 3½ times in its distance from end of snout; frontal at least one fourth longer than its distance from the end of snout; one fifth shorter than parietals; length of latter equal to their distance from rostral; nasal divided; loreal as high as long, forming equal contacts with eye and supraocular; two postoculars; temporals $1 + 1 + 2$, the upper tertiary largest; seven supralabials; seven infralabials, three in contact with first chinshields which are about one fourth shorter than second pair.

Scales smooth save that the lateral scales in front of anus and four lateral caudal rows are distinctly keeled, as is the outer edge of the first subcaudals. Scale formula 15-15-15; ventrals 207; anal divided; 55 subcaudals, of which the third to tenth are undivided.

Tip of snout black, the color covering first three labials and upper part of fourth, the supraoculars, frontal, and a narrow margin of parietals that border frontals. There are 16 black bands on body, their width equal to four scale lengths; anterior edges of black bands straight, posterior edge dentate; on each side a yellow band two

PLATE XX. *Micrurus nigrocinctus nigrocinctus* (Girard), M.N.H. No. 25190, Boquete Camp on Pan-American Highway, Pacific slope, Cerro de la Muerte; total length, 596 mm.

scales wide borders the black; red bands between yellow bands, all scales of which have a black spot; on ventral surface body bands occupy two or three ventral scales, the red and yellow, eight to eleven; there are five black bands on tail, each the width of five or six subcaudals.

Usually on each of the ventral red areas there is a single small black fleck. The yellowish band on the back of the head terminates one scale row back of the parietals; it is continuous under chin, covering all of it save the anterior portions of the first three infralabials. Total length, 596 mm.; snout to vent, 502 mm.; tail, 94 mm.

This specimen differs from other Costa Rican and Panamanian specimens that I have examined in having several of the subcaudals single.

The type specimens of *Elaps nigrocinctus* Girard * were collected on Taboga Island, Bay of Panamá, Panamá, by Lieut. J. M. Gilliss. The two specimens are U. S. N. M. No. 7347 (2 specimens), the larger ♀ (figured) and a smaller ♀ cotype. The figured specimen has 16 body bands (including the nuchal) and four on tail, the terminal band being very small. The yellow borders of the black bands are scarcely indicated in the larger cotype, but the smaller specimen has one or one and one-half scale rows of yellow bordering the black bands. The smaller specimen has 14 bands on neck and body, four on tail. The ventral counts of the two specimens are respectively 213 ventrals, 36 + 1 subcaudals; 214 ventrals, 35 subcaudals. Girard reports 217 + 1 ventrals (probably counting the small scales on chin posterior to chinshields); subcaudals 18. The latter figure is an error probably for 38 which would be correct if the small scale lateral to the anal is counted. Total length, 760 mm.; tail, 72 mm.

The mainland specimens of *nigrocinctus* agree fairly well with the small Taboga Island form although there is usually a somewhat larger number of body bands (15 to 17) and the ventral count is higher, the subcaudal count lower; however, the total ventral-subcaudal counts are 244-256, similar to the total in the types. This variation may represent merely a sex difference.

* Proc. Acad. Nat. Sci. Philadelphia, vol. 7, 1854, p. 226; and U. S. N. and Astro Exped., vol. 2, Zool. 1855, pl. 35, figs. 1-6.

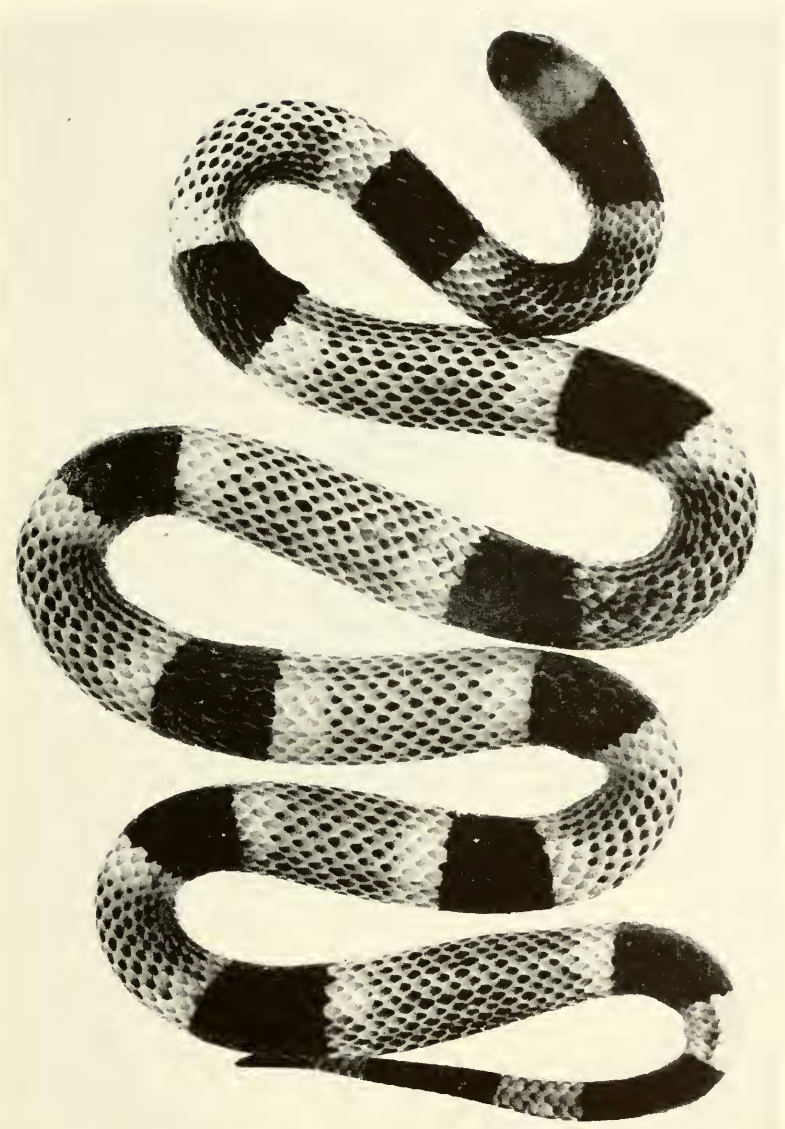


PLATE XXI. *Micrurus nigrocinctus mosquitensis* Schmidt, RCT No. 471, La Suiza, July 15, 1947; about natural size.

Micrurus nigrocinctus mosquitensis Schmidt

Plate XXI, text fig. 5

Micrurus nigrocinctus mosquitensis Schmidt, Zool. Ser. Field Mus. Nat. Hist., vol. 20, 1933, p. 33 (type locality, Limón, Costa Rica).

Elaps fulvius Picado, Serpientes Venenosas de Costa Rica, 1931, pp. 28-29, fig. 8 (left) (non *Elaps fulvius* [Linnaeus]).

Five specimens of this species were collected in the Caribbean drainage of Costa Rica. Two are from the lowlands (elevation less than 900 ft.) at Los Diamantes, one mile south of Guápiles (RCT no. 1442, MNH no. 25191). Two were taken at Turrialba (RCT no. 15, MNH no. 25166), and one at La Suiza, five to six miles southwest of Turrialba (RCT no. 471). This series of specimens agrees in general in the following color characters:

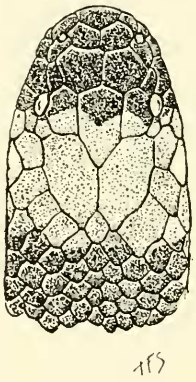


FIG. 5. *Micrurus nigrocinctus mosquitensis* Schmidt, RCT No. 471. La Suiza, Costa Rica. Head dorsal view $\times 3$.

Anterior part of head black, this color reaching back and including most of supraoculars, entire frontal, most of fourth supralabial, and a narrow black stripe behind eye on postoculars; a light yellowish band crossing back of head reaches one scale-length back of parietals, passes under chin to near median ventral line, where it is interrupted by a black or blackish longitudinal stripe connecting blackish area on front of chin with first black neck band. Paired chinshields are black with some light flecks.

Body with 10-12 bands varying in length from six to nine scale-lengths. Anterior edge of each band straight, posterior edge dentate; yellow bands bordering black, washed with brownish fawn, their length equal to three scale-lengths. Intervening spaces dull red above, orange or tomato-red below; each scale with a very distinct black spot often covering more than half its area; red

ventrals have small black flecks or blotches. On venter, black bands have a length of six ventrals on anterior part, and five ventrals on posterior part of body; each black band bordered by immaculate yellow for a width of two ventrals. Tail with from three to five bands, having a length of nine or ten scales, and covering nine or ten pairs of subcaudals ventrally except where the last black spot is terminal in which case band may be small.

The two Turrialba specimens, from elevations of 1750 and 1950 ft. have practically no dark blotching or spotting on the ventrals and all caudal red bands lack many of the black spots on the dorsal and lateral scales. The yellow head band is dim but in those from near Turrialba the area is suffused with smoky fawn.

The figure given (pl. XXI) shows the general characteristics of the form, particularly the wide yellow bands bordering the black.

I have examined the type and certain paratypes* of *mosquitensis*.

SCALE DATA ON MICRURUS NIGROCINCTUS MOSQUITENSIS

No.	Sex	Ventrals	Subcaudals	Total	Black bands body and tail	Supralabials	Infralabials
15	♂	189	47	236	11 + 4	7–7	6–6
471	♀	210	35	245	12 + 3	7–7	6–6
1442	♀	208	35	243	12 + 3	7–7	6–6
25166	♂	(192)*	48	240	10 + 5	7–7	6–6
25191	♂	193	49	242	11 + 5	7–7	6–6

* Estimate, since the body is broken and part missing.

TABLE OF MEASUREMENTS OF MICRURUS NIGROCINCTUS MOSQUITENSIS

No.	Sex	Total length	Tail	Snout to vent
15	♂	494	78	316
471	♀	568	58	510
1442	♀	698	75	623
25166	♂	750*	114	636*
25191	♂	480	73	407

* Estimate.

Micrurus pachecoi subsp. nov.

Plate XXII, text fig. 6

Type.—Univ. Kansas Mus. Nat. Hist. No. 25188; Guanacaste, Costa Rica; collector and date unknown.

Diagnosis.—A large species with 22 bands on body and 5 on tail, 6 counting a black tip. Ventrals 215½; subcaudals 40; very few or no black spots on red areas; dark pigment dispersed, slightly

* One of the numbers listed as a paratype, U. S. N. M. No. 9784, is a specimen of *Erythrolamprus aesculapii;* it is possible No. 9785 is intended since this is a coral snake with 19 bands on body and six on the tail. I do not believe this to be a *mosquitensis*, however; the diagnosis of the form mentions body bands "10-19 on the body," and this may be the source of the "19" since all specimens that I regard as authentic *mosquitensis* have a much lower count of black bands.

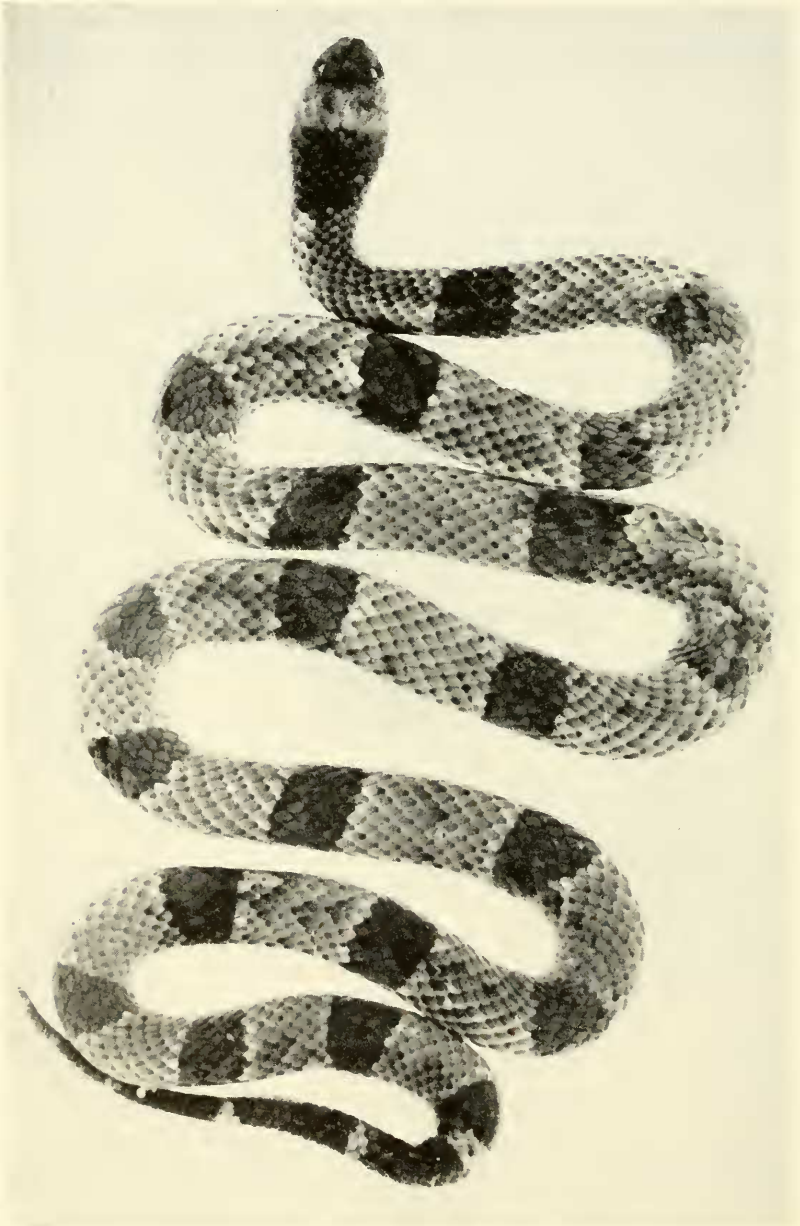


PLATE XXII. *Micrurus pachecoi sp. nov.*, MNH No. 25188, Guanacaste, Costa Rica, August 1947; total length, 984 mm.

heavier near posterior tip of scales; yellow bands narrow, pigmented, about one scale-length wide. Temporals 1 + 2. (Since specimen is female it is impossible to say whether the male may have the keeled scales on sides above anus.)

Description of the type.—Rostral injured, slightly visible from above; internasals a little more than half the length of the prefrontals which are about one fifth wider than long, forming an acute angle between loreal and posterior nasal; *supraoculars equal to or only slightly less than width of frontal; latter scale almost twice as long as wide,* about one fourth or one fifth longer than its distance from tip of snout; length of parietals equal or slightly greater than their distance from snout tip; nasal divided, loreal longer than wide,

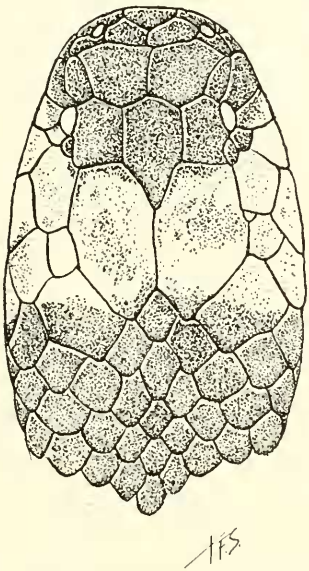


FIG. 6. *Micrurus pachecoi sp. nov.* Type. MNH No. 25188, Guanacaste, Costa Rica.

entering orbit and forming a rather large suture with the supraocular; no preocular; two postoculars; temporals 1 + 2 + 2, upper posterior largest; seven upper labials in the following ascending order of size: 1, 2, 4, 3, 5, 7, 6, third and fourth entering orbit; infralabials seven, four bordering the first chinshields, which are about one fifth shorter than second pair; scales smooth, 15-15-15; ventrals 215½; subcaudals 40; 22 bands on body, 5 on tail, also a black tip.

Measurements in mm.—Total body length, 984; tail 102; snout to vent 882.

Color.—The black bands vary in width between four and five scale-lengths, while on the ventral surface they occupy two or three ventrals. The caudal bands are wider and may cover five to seven subcaudals; the width of the intervening red blotches is from six to eight scale-lengths, occupying six to eight ventrals on the under surface. The usual yellow borders on the black bands are obsolete or nearly so, save that the outer scale may be cream or yellow, very rarely the ventral scale preceding or following the black bands may be partially white. Some of the red scales have black dots but these are not very conspicuous since the whole scale has a brownish wash. The ventrals have a few black flecks on the posterior part of the body. The red bands on the tail are very narrow, one or two scale-lengths in width dorsally; on the subcaudal region the band is as wide as three subcaudals and a black spot is present in the center. Head and snout black, including frontal supraoculars, postoculars, first, second and the upper part of the third and fourth labials. The four anterior infralabials are dull black but the broad yellowish head band is continuous across chin. Dorsally the band is clouded with smoky black, lighter on the supralabials.

Remarks.—The specimen was presented to me alive by Prof. Marco Tullio Pacheco, and it is for him that the species is named.

The peninsula which juts out from the northern part of the west coast of Costa Rica includes much of the province of Guanacaste. It is connected with the main land mass by relatively low land, suggesting that it was formerly an island. I suspect that this species of coral snake was developed when island conditions obtained in the region. The reduction of discrete black spots on the red scales, the larger size of the supraocular scales with reference to the frontal, the increased number of black bands on body and tail, and the temporal formula 1+2, suggest the wisdom of regarding the form as having full specific rank rather than as a subspecies of the related *M. nigrocinctus*, until such time as intergradation is demonstrated. It may, however, be related to that species through *nigrocinctus coibensis* whose range is Coiba Island off the Pacific coast of Panamá.

Micrurus clarki Schmidt

Micrurus clarki Schmidt, Zool, Series Field Mus. Nat. Hist., vol. 20, Oct. 31, 1936, pp. 211-212 (type locality, Yavisa, Darien, Panamá).

This coral snake lacks the supra-anal tubercles in the male. It may be recognized by the following description: body form and general appearance that of *Micrurus corallinus;* supralabials 7-7;

infralabials 7-7; preoculars 1-1; postoculars 2-2; temporals 1 + 1, 1 + 1; ventrals 199, subcaudals 58; parietals angulate at sutures of temporals and post-temporals, and produced at the posterolateral angles into distinct points; 13 black rings on body, usually the width of three ventrals, and seven on tail; the nuchal black ring has a length of six scales, narrowed on belly to three ventrals; yellow, bordering black, one scale-length wide; scales of yellow and red zones uniformly spotted with black at tips; black of head extending to tips of parietals; yellow nuchal scales heavily black-margined; black caudal rings separated by yellow rings which are immaculate beneath but heavily black-mottled above; red ventrals immaculate. (From type description).

I have examined a Costa Rican specimen listed as a paratype. This has 189 (192) ventrals and 53 subcaudals. The black rings are 16 + 8 (9) on body and tail. This specimen, collected by Sr. José Zeledón, is without specific locality data.

Micrurus alleni richardi subsp. nov.

Plate XXIII, text fig. 7

Type.—Univ. Kansas Mus. Nat. Hist. No. 25189, collected by Edward H. Taylor and Richard C. Taylor, Sept. 8, 1947, at Los Diamantes about 2 km. southeast of Guápiles, Costa Rica.

Diagnosis.—A slender elongate form brilliantly colored with yellow-edged black bands on a red body. Black bands, 18 on body, four on tail; ventrals, 241; subcaudals, 32; space between black bands 2½ to 2¾ the length of a black band; scales of red areas with a black spot on each scale; narrow yellow areas with lighter spotting; ventral parts of the red and yellow bands immaculate. Black of snout extending back onto partietals.

Description of the species:—Rostral slightly visible above; internasals about half the length of prefrontals; latter scales very slightly wider than long laterally forming an angle between nasal and loreal; frontal narrow, one and two-thirds as long as wide, sharply angled posteriorly, considerably (¼) longer than its distance from tip of snout; parietals narrow, elongate, about one-sixth longer than frontal, about equal to their distance from internasals; nasal divided; loreal large, forming anterior border of eye and a broad suture with the supraocular; latter scale nearly as broad anteriorly as posteriorly; eye small, about 3.2 times in its distance from snout tip and about once and a half in its distance from the lip; no preocular; two postoculars, upper not noticeably larger than lower; temporals 1 + 1;

a large scale borders the posterior part of parietal; supralabials 7-7, in the following ascending order of size: 1, 2, 4, 3, 5, 7, 6; infralabials 7-7, four bordering anterior chinshields; posterior chinshields narrower and about one-fourth longer than anterior. Scales

PLATE XXIII. *Micrurus alleni richardi subsp. nov.*, MNH No. 25189, Los Diamantes, 2 km. SE Guápiles, Costa Rica, September 8, 1947; total length, 888 mm.

smooth except on side just anterior and posterior to vent, which are keeled. Scale formula, 15-15-15; ventrals, 241; subcaudals, 32; anal divided.

Measurements in mm.—Total length, 888; snout to vent, 815; tail, 73.

Color.—There are 18 black bands on body, and one crossing anterior part of head but incomplete below; four black bands on tail. Body black bands usually as wide as five or six scale-lengths, their anterior borders usually straight, the posterior borders dentate; black bands bordered by one or two rows of yellowish or yellowish white scales with usually a dark spot; intervening bands broad,

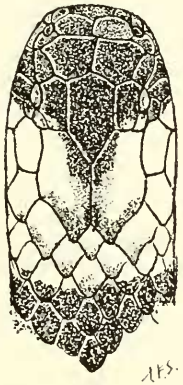


FIG. 7. *Micrurus alleni richardi subsp. nov.* Type. MNH No. 25189, Los Diamantes, Costa Rica.

red, each scale of which bears a black spot; these bands are more than double the width of the black bands, being equal to 10-12 scale-lengths; on ventral surface the black covers three or four ventrals on body, five to six subcaudals; the red and white (yellow) together cover nine or ten ventrals except the first two, which are 15 and 12 respectively; under tail the red occupies four or five pairs of subcaudals; snout and anterior part of infralabials black. This includes first three supralabials, most of the supraoculars, all of the frontal, and some of anterior mesial part of the parietal; posterior edge of the black is bordered by a clouded fawn border that extends to back edge of parietals. Thus the yellow head band is partially interrupted on the median dorsal line but is continuous on sides of head and chin.

Remarks.—The colors of this specimen were extremely brilliant in life. This specimen was apprehended after it had entered a crev-

ice in a stony bank of a small river, and only a small part of the body was in evidence. In the same area within a few hundred yards, specimens of typical *Micrurus nigrocinctus mosquitensis* Schmidt were found.

The fact that this form occurs together with *Micrurus nigrocinctus mosquitensis* leads me to believe that both forms cannot belong to *nigrocinctus*. The elongation of the body, and the great increase in the ventral-subcaudal count causes me to consider *alleni* as a distinct species, although it was described as a subspecies of *nigrocinctus* originally.

The differences between this presumed subspecies and *a. alleni* consists in narrower yellow borders on the black bands, the black spotting on the yellow bands, more elongate red areas, and the immaculate condition of the yellow and red areas on the venter. (Compare the figure given herewith of *alleni richardi* with the figure of *alleni alleni* (*nigrocinctus alleni* Schmidt) given by Schmidt (Zool. Series Field Mus. Nat. Hist., vol. 20, 1936, p. 210).

The species is named for Richard C. Taylor who assisted in the capture of the type.

FAMILY VIPERIDAE

Three genera, *Lachesis, Bothrops* (composite) and *Crotalus,* are recognized as occurring in Costa Rica.

KEY TO COSTA RICAN GENERA OF VIPERIDAE

1. A series of rattles at termination of tail ..... *Crotalus*
   No series of rattles at tip of tail 2
2. Subcaudals partly double, partly quadruple ..... *Lachesis*
   Subcaudals never quadruple, but occasionally partly or wholly double or completely single (composite) ..... *Bothrops*

Genus BOTHROPS Wagler

Bothrops Wagler, *in* Spix, Serpentum Barsiliensium . . . , 1824, p. 50.

Genotype: *Coluber lanceolatus* Lacépède.

The genus as here used is a complex of several genera or subgenera, most, if not all, of which have already been named. Insufficient comparative material prevents me from attempting to resegregate the species into their proper genera.

There are ten species known in Costa Rica.

KEY TO THE SPECIES OF BOTHROPS IN COSTA RICA

1. Supralabials seven, much enlarged; subcaudals divided; large terrestrial snakes reaching two meters in length ..... *atrox atrox*
   Supralabials nine or more; subcaudals all or part (*picadoi* and *nummifer*), single .. 2
2. Two or three more or less erect pointed scales between supraocular scale and eye; tail prehensile, arboreal ..... *schlegelii*
   No erect spinelike scales between supraocular scale and eye 3

3. Second labial forms part of border of loreal pit; green with a cream line on first scale row (young with a blotched pattern)..... *lateralis*
Second labial not forming part of border of loreal pit; no cream line on first scale row 4
4. Rostral scale at least one and a half to one and two-fifths times as high as wide, rising considerably above level of head to form a proboscislike appendage, directed upward; one canthal between internasal and preocular..... 5
Rostral scale reaching no higher than level of head, or at most to height of canthal ridge 6
5. Ventrals 130-145; color pattern of more or less distinct blotches..... *nasuta*
Ventrals 147-159; pattern of more or less regular small black marks..... *lansbergii*
6. Combined supraocular width one fourth (or less) width of head between eyes; large snakes with body scales strongly keeled (and beaded in adults)..... 7
Combined supraocular width usually equal to one half width of head (very rarely one third); scales keeled; but never strongly beaded..... 8
7. Body very thick, short (700-800 mm.); rostral separated or at least partially separated from nasal by a row of intercalated scales..... *nummifer nummifer*
Body longer, thicker (1000 mm. or more); rostral not even partially separated from nasal by intercalated scales..... *picadoi*
8. Color dark green, most scales with black markings; tail prehensile..... *nigroviridis*
Color not green; most scales lacking black markings; tail not prehensile..... 9
9. Dorsal scales on head more or less irregularly enlarged, smooth; black line from eye ..... *godmani*
Dorsal scales on middle of head nearly uniform, those on snout somewhat larger, all keeled; a raised canthal ridge; no distinct black line behind eye; pattern of quadrangular blotches ..... *ophryomegas*

Bothrops schlegelii (Berthold)

Trigonocephalus schlegelii Berthold, Abh. Ges. Wiss. Göttingen, vol. 3, 1846, p. 13, pl. 1, figs. 5-6 (type locality, Colombia).

B[othrops] schlegelii Jan, Elenco systematico degli ofidi, 1863, p. 127.

Bothrops (Teleuraspis) nigroadspersus Steindachner, Sitz. Akad. Wien, Bd. 42, Abt. 1, 1870, p. 348, pl. 8.

Bothrops schlegeli Picado, Serpientes Venenosas de Costa Rica . . . , 1931, pp. 76-80, figs. 32-35 (Santa Clara, Sarapiquí, Miravalles, Volcán Poás).

Two of the so-called color phases of this species were acquired at Turrialba, Costa Rica. The specimen (M.N.H. No. 25162 ♂) is grayish to brownish black with a series of reddish-brown lighter spots, about 22 on body and 6 or 8 on the tail (indistinct posteriorly on tail). The neck is whitish becoming gradually yellowish on anterior half and reddish brown on the posterior part, strongly defined under tail. On the sides of the ventrals and usually including one lateral scale is an irregular series of white spots, often more or less quadrangular; on the anterior part of the body these can be seen outlined faintly by pigment on the medial part of ventrals.

The following scale characters are present: Scale formula 30-21-21-17, the outer row lacking keels; ventrals 160, subcaudals 53; dorsal head scales keeled very strongly, as well as those on temporal region; canthal scales elevated forming low spines. Supralabials 8-8, second almost entirely fused with scale forming anterior border of pit; three small loreals; fourth labial separated from

elongate subocular by two scale rows; infralabials 10-11, first two touching first chinshields, others separated by very small scales; second pair of chinshields separated from each other by a small pair of scales; two elongate, more or less erect pointed scales emerge between supraocular and eye, bordered at their base by a few minute scales; scales bordering canthus, especially two anterior, sharp-edged and partly erect; supraoculars large, longer than wide; posterior part of nasal free, somewhat erect; three preoculars; nasal very large, at most only partially divided.

M.N.H. no. 25159. Aside from being a brilliant yellow (faded with small black spots in evidence, in the preservative) the scale formula is 33-23-25-19-15, which compares poorly with that of the male specimen (30-21-21-19-17). The ventral-subcaudal counts do not differ greatly, the ventrals (♀) being 154½, the subcaudals 54; 160-53 in the male specimen, with totals of 208½ for the female and 213 for the male. Probably in the majority of snake genera, when the scale rows on body normally remain the same in both sexes, the female has a longer snout-to-vent measurement proportionally and the number of ventrals is greater, the subcaudals fewer than in corresponding males of a given population. Where a difference normally exists in the scale rows about body, between the sexes, and the larger number occurs in the females, the number of ventrals may be expected to be equal to those in males, and likewise the totals of the ventrals and subcaudals should be nearly equal. It would appear that the added scale rows represent a compensation so that adequate space is provided for the young in the female, rather than by the more usual procedure of lengthening the body cavity by moving the anal opening a distance of several ventrals to the rear.

For a very long time Schlegel's *B. nigroadaspersus* has been considered a synonym of *B. schlegelii*. If two forms are not involved it may be that the major differences indicated by the two forms are sexual, since the dark specimen taken at Turrialba is a male, the brilliant yellow one a female.

It is not so easy to account for an increase in head size. Presumably larger head size would allow engulfing larger prey and it is not difficult to see the survival value of this, in allowing a wider choice of food with the same effort. However, I strongly suspect that in this case something more than a sex difference is involved.

The measurements of the two specimens are placed here for direct comparison.

MEASUREMENTS OF BOTHROPS SCHLEGELII

No.	Sex	Total length	Snout to vent	Tail	Head length	Head width
25159	♀	448	366	82	27	21
25162	♂	445	365	80	21	17

It is to be noted that a somewhat wider gape, made possible by the larger size, would allow a somewhat larger labial surface and hence the added infralabials. The greater roughness of the head scales of males may represent a secondary sex character such as keeling of scales on sides of anus, rugosities on chins, etc., that are encountered in males of other genera. The more elongate tail is a factor in its prehensility.

In Costa Rica the name Oropel is applied to the yellow form, while the names Bocaraeá or Toboba are applied to the darker-colored forms.

Bothrops lateralis (Peters)

Bothriechis lateralis Peters, Monatsb. Akad. Wiss. Berlin, 1852, p. 674 (type locality, Costa Rica).

Bothrops lateralis Picado, Serpientes venenosas de Costa Rica . . . . 1931, pp. 85-87, figs. 38, 39 (Alturas de Orosi; Santa María de Dota; Montañas de Navarro).

Five specimens of this well-known, easily-recognized species are at hand. The two young specimens (M. N. H. Nos. 25160, 25161) were collected at an elevation between 5000-6000 feet on Volcán Poás at Isla Bonita, and two adults (M. N. H. Nos. 25687, 25688) were collected from the same locality; M. N. H. No. 25163 was taken 2 miles above Santa Cruz on Volcán Turrialba at an elevation of between 6500-7000 feet.

The following characters are evident in the adults: rostral nearly triangular, a little broader than high; nasal single with a slight suture evident; second labial enters pit and forms anterior boundary; loreals, three (rarely four), the upper largest between nasal and upper preocular; supralabials separated from subocular by one scale row.

The scale formula for both sexes is (33-30) 21-21-17; supralabials 10 (rarely 9 or 11); infralabials 12 (more infrequently 11, or 10), three of these touching the anterior chinshields; four pairs of chinshields, all save first pair separated by small scales; usually 3 (rarely 4) postoculars; subocular enlarged.

Body scales rather pointed behind, keeled save on outer row. No. 25163 is uniform green above with a few small yellow flecks; greenish yellow on ventral surface, median area more yellow than outer parts; a whitish line beginning on neck borders the outer ventral

edge and lower edge of first scale row; labials yellowish, chin largely cream; tail bluish green to blue.

Nos. 25687 and 25688 agree closely with the preceding save that the dorsal yellow or light flecks tend to form a transverse series of spots on each side at rather regular intervals, their edges occasionally black, and tending to alternate on the two sides; approximately 22-24 on body, 8 on tail. Young specimens (25160-61) are light lavender (in preservative) with a series of black bars, lighter-edged behind; these may be continuous across back or alternate (there are 23 on body, 6+ on tail); between the bars there are other indefinite black markings. These color differences are those of age only.

The species is known in Costa Rica under the name Culebra Lora. It has been reported from numerous localities.

I have examined specimen A. M. N. H. No. 17372 and specimen U. S. N. M. No. 37730, both from "Costa Rica."

TABLE OF DATA ON BOTHROPS LATERALIS (Peters)

No.	Sex	Ventrals	Subcaudals	Total length	Tail length
25688	♂	166	66	632	105
25687	♀	155	58	760	110
25160	♀	164	61	255	44
25161	♀	169	61	234	43
25163	♀	161	54	715	109

Bothrops nigroviridis nigroviridis (Peters)

Bothriechis nigroviridis Peters, Monatsb. Akad. Wiss. Berlin, 1859, p. 278, pl. —, fig. 4.

Bothrops nigriviridis F. Müller, Verh. Nat. Ges. Basel, Bd. 6, 1878, p. 401; Picado, Serpientes Venenosas de Costa Rica . . . , 1931, pp. 80-85, figs. 36-37 (Volcán de Barba; vertientes del Río Sarapiquí; faldas de Poás, altos de La Palma).

Lachesis nigroviridis Boulenger, Catalogue of the Snakes in the British Museum, vol. 3, 1896, p. 568.

A single specimen (M. N. H. No. 25699 of this species was obtained at Isla Bonita at about 5500 ft. elevation. This form has a rather short head, more or less rounded, the rostral very slightly broader than high; nasals large, single, but sometimes partially divided; five or six loreals; three preoculars, upper large, separated from nasal by upper enlarged loreal; scales on snout imbricate, more or less symmetrical, smooth, about four or five rows between the enlarged supraoculars; latter scales large, the outer edges slightly elevated; one scale below supraoculars bordering eye; one or two postoculars; a large subocular in contact with or separated by one scale from lower preocular; supralabials 9-9, the second separated from pit by a large scale, the third separated from it by a small scale; infralabials 9-9, the first three touch the first pair of chinshields which are larger than two succeeding pairs; all

pairs of chinshields without intercalated scales; scale formula, 25-21-19-19-17, all keeled except outer row; ventrals, 143; subcaudals (single) 50; anal single.

The specimen here described is somewhat discolored by preservative. In life, however, the species is green, strongly speckled with black; a black streak on head from canthus to angle of mouth passing above the eye; top of head may be streaked with black; yellowish beneath, some or all of the shields black edged.

The shed epidermis of this snake is strongly pigmented but in each scale there is a small unpigmented area. Dr. Picado (*loc. cit.*), gives excellent photographs of several living specimens, and notes that it occurs at elevations of more than 2000 m. The Costa Rican name is Víbora de Arbol.

The following specimens have been examined also: A. M. N. H. No. 17283, Volcán Barba; U. S. N. M. Nos. 32580-32581, Pico Blanco.

Bothrops nasuta Bocourt

Bothrops nasutus Bocourt, Ann. Sci. Nat., ser. 5, vol. 10, 1868, p. 202 (Pansas, bank of Polochic, Guatemala); Amaral, Bull. Antiv. Inst. Amer., vol. 3, 1929, pp. 25-27, pl. 3, a-d, text fig. 7 (Zent, Limón and Sipurio, C. R.); ? Picado, (*part.*) Serpientes Venenosas de Costa Rica . . . , 1931, pp. 69-73, figs. 30, 31.

Snout pointed, turned up at end with a sharp canthus rostralis; rostral usually 1½ times as high as wide; canthus formed from one elongate internasal, one canthal and upper part of preocular, their edges rough. Nasal not completely divided; a pair of elongate internasals, elevated anteriorly; upper head scales imbricate, strongly keeled; large supraoculars separated by from five to seven scale series; two or three scale rows between labials and eye; subocular sometimes broken; temporals all keeled; supralabials nine to eleven, none bordering the sensory pit; scales of body 23-27 (23-25); ventrals 130-145; anal entire; subcaudals single, 24-35; body slender, tail short, not prehensile.

Yellowish brown, pale brown or grayish above, with a dorsal series of 13-20 large, dark brown, black-edged rhomboidal or squarish spots, usually divided on median line by a narrow white or orange line; occasionally the spots on the two sides tend to alternate; sides of head blackish; belly powdered with brown with or without whitish spots.

The species is known to occur on the Carribean drainage area. In Costa Rica it is known under the name Toboba Chinga.

I have examined the following specimens: A. M. N. H. Nos.

17287, 17308, Sarapiquí; No. 17332, Sipurio; U. M. M. Z. No. 17306, San José.

It has also been reported from Zent and Limón on the east coast.

Bothrops ophryomegas Bocourt

Bothrops ophryomegas Bocourt, Ann. Sci. Nat., ser. 5, vol. 10, 1868, p. 201 (type locality, Occidental slope of Esciuatla range, Guatemala); Amaral, Bull. Antiv. Inst. Amer., vol. 3, no. 1, 1929, pp. 23-24.

Data for this is taken from Amaral's redescription (*loc. cit.*). Body long and slender, tail short, not prehensile; head wide, snout not turned up; canthus rostralis raised and sharp, formed by one internasal, two canthals and upper part of preocular; rostral slightly higher than wide; internasals short and straight; canthals double and small; supraoculars large with ridgelike border; head scales keeled; supralabials 9-10; body scales in 25-27 rows; ventrals 166-173; subcaudals entire, 32-39.

Brown above with 26 to 40 small black markings placed in pairs along the vertebral line alternating with or opposite to those of other side; flanks with darks spots in pairs; corresponding to vertebral markings; belly light, speckled or transversely marked with brown; sides blotched with dark; head with a dark line behind eye and dark markings on the top; lips with light spots.

I have examined specimens of this species as follows: U. M. M. Z. No. 83183 Esparta; No. 83184 Puntarenas; U. S. N. M. No. 37728 Esparta and No. 37729 Jiménez.

This form is regarded by Amaral as belonging to the arid, west coast areas of Central America.

Bothrops lansbergii (Schlegel)

Trigonocephalus lansbergii Schlegel, Mag. de Zool., 1841, 1-3, Rept. pl. 1 (type locality, Turbaco, Colombia).

Bothrops lansbergii Jan, Elenco sistematico degli ofidi, 1863, p. 127 (Costa Rica, etc.); Amaral, Bull. Antiv. Inst. Amer., vol. 1, no. 1, 1927, p. 22, and *ibid*, vol. 3, no. 1, pp. 19-27, fig 1; Dunn, *ibid*, vol. 2, no. 2, 1928, pp. 29-30; Loveridge, *ibid*, vol. 2, no. 3, pp. 64-65.

This species is represented in my material by a single female specimen (M. N. H. No. 25689) obtained at Turrialba, July 11, 1947. The characters of this specimen are: body rather thick and short; tail short; rostral vertical, the width in height one and one half times; three ridged canthals, the anterior elongate, bordering its fellow on median line behind rostral; a small median scale follows their common suture; third scale on canthus is the very large upper preocular; supraoculars border orbit, one and a third times as long as wide; six scales between the supraoculars; head scales

dimly keeled, except perhaps the first row on snout; nasal large, with a small entrant suture from top, the posterior part of scale concave; seven small and two large loreal scales; second preocular bordering upper part of pit broken into three scales; lower preocular small; two rows of small scales between anterior labials and pit; four rows of scales between labials and eye (or 3 rows and subocular, latter may be broken); supralabials 10-9, fourth distinctly largest; infralabials 11-10, three touching first pair of chinshields which are more than twice as long and at least three times area of second pair; anterior chin scales, labials, nasal and rostral more or less covered with small tubercles; scale formula; 39-25-23-23-19; ventrals, 139; subcaudals, 28, single; anal single.

Dorsal color bluish to ash gray with small discrete black spots, the ventral coloration being lavender; a few white flecks present low on sides, extending occasionally onto ventrals; dark spots arranged in groups of four as if marking the four corners of a quadrangle, and opposite or (occasionally) alternate with a similar grouping on opposite side; 15 present on each side. On underside of jaw some light lavender marks, the one beginning back of jaw angle forming an irregular line for a short distance.

The name by which this species is known in Costa Rica is La Tamagá; it is said to reach half a meter in length only rarely. This specimen has a total length of 294 mm.; tail, 31 mm.

Males and females differ somewhat in the character of the canthus. In females this rough, serrated appearance is lacking almost completely. The known ventral range is 130-145; subcaudal range, 24-35, according to Amaral.

Bothrops atrox atrox (Linnaeus)

Coluber atrox Linnaeus, Museum Adolphus Friderici regis, vol. 1, 1754, p. 33, pl. 22, fig. 2, and Systema Naturae, vol. 1, 1766, p. 383 (type locality ?).

Bothrops atrox (*part.*) Duméril, Bibron and Duméril, Erpétologie Générale, vol. 7, 1854, pp. 1507-1509.

This great pit viper, known commonly under the name *La Terciopelo*, is, according to Sr. C. Picado-T., the most feared snake in the country of Costa Rica, because of its deadly bite and great size. It is reported as reaching a length a little greater than two meters.

A specimen, M. N. H. No. 25677, was killed close to the central station at Los Diamantes (rubber plantation) near Guápiles in early September 1947, and presented to us by Mr. Wallace Manis, the Director of the plantation and our genial host.

Scale data on this specimen follow: rostral as wide as high, visible above as a tiny triangle bent flat on tip of snout; two canthal

scales form a bordering keel together with upper edge of the upper preocular; supraoculars very large, twice as long as wide, separated from each other by six or seven scale rows; upper surface of snout a little more elevated than interocular area; nasal completely divided; two loreals, upper largest; second labial forming anterior border of pit, the scale showing a partial division; supralabials 7-7, all very large save first two; subocular irregular, elongate, lower preocular divided vertically; two scales between subocular and second labial; one scale row between fourth labial and subocular; dorsal head scales keeled; lateral scales of head smooth save the upper temporals; ten lower labials, three touching first chinshields, which are a little longer and considerably larger than second pair; scales strongly keeled; the scale formula, 33-27-27-19; anal single; ventrals 192; subcaudals divided, 67; total length, 1773 mm.; the tail, 223 mm.

It has been reported from numerous localities in the lowlands.

Bothrops picadoi (Dunn)

Trimeresurus nummifer picadoi Dunn, Proc. Biol. Soc. Washington, vol 52. 1939, pp. 165-168, (La Palma, C. R., elev. 4500 ft.).
Bothrops picadoi Smith and Taylor, Bull. U. S. Nat. Mus., No. 187, Oct. 5, 1945, pp. 182-183.

This large species, which in size stands between *nummifer* and *atrox*, seems to occupy a region on the central plateau of Costa Rica and the surrounding mountains. The specimens in the collection M. N. H. (Nos. 25672-75) were obtained at Isla Bonita (A. C. P.) on the eastern slope of Volcán Poás at an elevation between 5000 and 6000 ft. In this area it is confused with the *mano de piedra* (*nummifer*), under which name it is known.

Rostral more than once and a half as wide as high, reaching level of snout, visible above as a rather narrow line; nasals completely divided, the anterior larger part bordering rostral without any intercalated scales; supraocular broken up and a small narrow elongate part of it, differentiated from other head scales, borders eye and is separated from its fellow by eleven rows of lightly keeled head scales; canthal scales not forming a shelf; a large loreal between very large preocular and posterior nasal; one to three small loreals below this scale; subocular elongate, narrow; three postoculars; a large triangular upper preocular, and small lower which borders pit; supralabials 9-10, the first, second and third separated from scales surrounding pit by one scale row, fourth and fifth separated from labials by three or four scales; infralabials 9-11, two touch first pair of chinshields which are more than twice length of second

or third pairs, and three times area of second pair; the first pair of infralabials are separated in four out of six cases, and in these exceptions they are very narrowly in contact. All scales are keeled or beaded, the keel widening and forming a low rounded mound posteriorly on the scale. This is especially prominent on the females, less so in males.

The type of this species which I have examined is a young specimen with the markings differing slightly from specimens here recorded. One other specimen, R. C. T. No. 695, is included on the data sheet.

TABLE OF DATA FOR BOTHROPS PICADOI (Dunn)

No.	Sex	Scale formula	Ventrals	Subcaudals	Supralabials	Infralabials
695	♂	28–25–21	146	38	9–10	11–11
25675	♀	30–25–21	148	32	10–10	11–11
25676	♀	30–25–21	152	23+	10–10	11–11
25673	♀	33–25–21	146	33	10–10	11–12
25672	♀	33–25–21	149	33	9– 9	11–11
25674	♂	31–25–21	146	40	9– 9	10–10

TABLE OF DATA FOR BOTHROPS PICADOI (Dunn) (concluded)

No.	First infralabials separated	Infralabials touch chinshields	Total length	Tail	Divided subcaudals
695	no	2	1202	120	11 (5, 14–24)
25675	yes	2	955	89	0
25676	yes	3	930+	68+	0
25673	yes	2	257	27	0
25672	no	2	269	30	13 (12-25)
25674	yes	2	249	29	2 (last two)

Bothrops nummifer nummifer (Rüppell)

Atropos nummifer Rüppell, Verz. Mus. Senck., Amph., 1845, p. 21 (type locality, Mexico).
Bothrops nummifer Jan, Elenco Systematico degli Ofidi, 1863, p. 126.

This extremely thick, short snake is known in Costa Rica under the name *mano de piedra.* It ordinarily reaches but little more than half a meter in length, but the body is as thick as that of *picadoi* of nearly double its length. The most distinctive characteristic of the snake is the strong ridge on the back, especially prominent on the anterior half of the body, bearing three scale rows, a median and two adjoining lateral rows all very heavily keeled or tubercled. One specimen, M. N. H. No. 25678, was obtained at the Inter-American Institute of Agriculture, three km. west of Turrialba.

In this the following scale characters obtain: rostral triangular, not visible above, distinctly wider than high, separated from nasal on right side by three intercalated scales, on left by two scales only, thus allowing rostral and nasal to touch at one point; nasal divided

completely, the anterior part the larger and somewhat convex; dorsal head scales heavily keeled, the anterior ones tending to bend down to touch rostral in front, and in canthal and supraorbital regions, to form slightly projecting shelves; an elongate loreal borders canthal edge touching first supraocular and posterior nasal; eight or nine small loreals; supraocular broken into several small scales, not or scarcely larger than adjoining scales; subocular narrow, elongate; two or three postoculars; only one large preocular; the two scales below it are pushed forward more than their length in front of the eye; supralabials 9-10; third separated from facial pit by two or three scale rows, fourth and fifth separated from subocular by three rows; infralabials 12-13, three touch first chinshields which are double size of two succeeding pairs.

Scales keeled, the scale formula being 30-25-19; ventrals 122; subcaudals 35, first two pairs divided, others single. The total length is 790 mm.; tail, 91 mm.; head width, 45 mm.; head length, 57 mm.; height of body, 55 mm.

The basal pattern gray with 16 saddlelike darker brown rhombs on back, each with a somewhat lighter center and each with a narrow lateral extension onto the ventrals; low on sides a series of small black spots alternating with the rhombs; frequently rhombs are contiguous middorsally and bordered by lighter gray color, especially along the upper parts; base of tail with two discernible rhombs but the remainder of tail black above and below; a diagonal black stripe from eye to behind jaw angle; chin, throat and anterior part of body white on ventral surface; but posterior part of body clouded with pigment and numerous more or less quadrangular black spots.

The specimen when in captivity was quiet, save that on being disturbed by the approach of anyone, the head was moved in a series of slight rapid jerks. When dissected it was found to contain 27 embryos.

This is a wide-ranging species occurring as far north as San Luis Potosí, Mexico. Known variation in ventrals, 121-135; subcaudals 26-37, the higher numbers being from the northern part of the range.

The species has been reported in the literature from El General, Monte Redondo, Chitaria, Cariblanco, Peralta, Guápiles, and Siquirres, in Costa Rica.

Bothrops godmani (Günther)

Bothriechis godmanni Günther, Ann. Mag. Nat. Hist., vol. 12, 1863, p. 364, pl. 6, fig. G, G' (near Dueñas, and on other parts of the tableland of Guatemala). (The species was named for Godman. The original "*Godmanni*" constitutes an error of transliteration.)
Bothrops godmanni Amaral, Mem. Inst. Butantan, tome 4, 1929, p. 235 (or 109).

This species, recently collected in Panamá, occurs to the north of Costa Rica and perchance will eventually be found in Costa Rica. I know of no records to date. It may be characterized as follows: rostral broader than high, extending to upper level of head, equally as high as the anterior nasals, but broader than high; supraoculars large, often with other somewhat enlarged scales (frontal or parietals) appearing; number of scales between supraoculars from three to seven; scales of top of head keeled; nasal divided, the anterior part largest and not separated from rostral by intercalated scales; a large preocular separated by the large loreal from the posterior nasal; supralabials 9-9, the second not joined to pit scale, or bordering pit; a single series of scales between labials and elongate narrow subocular; 10-11 infralabials, four touching chinshields; second chinshields small, separated by a pair of scales; scale rows 23-21-21-19(17), keeled except outer row; ventrals 146; anal single; subcaudals 36, none divided.

Above olive gray with a black stripe beginning behind eye and reaching onto neck, bordered above and below by whitish, touching two or three supralabials; side of head, labials, and chin grayish white; body gray-olive with a series of median blotches of brownish black, darker edged, often contiguous or confluent; a series of lateral spots usually bordered with whitish gray. On outer edge of ventrals a series of spots that may be partly edged with whitish, becoming obsolete or merged with dark ventral coloration. Throat grayish white; body becoming rapidly darker until on the latter half body nearly uniform black. (U. S. N. M. No. 24782.)

The measurements are: total length 550 mm.; tail 65 mm.

The known variation in ventrals is from 142 to 148; subcaudals 28 to 36.

Genus CROTALUS Linnaeus

Crotalus Linnaeus, Systema Naturae, 10th ed., vol. 1, 1758, p. 214.

Genotype: *Crotalus horridus* Linnaeus.

A single species is known to occur in Costa Rica.

Crotalus terrificus durissus Linnaeus

Crotalus durissus Linné, Systema Naturae, vol. 1, p. 372, 1766 (type locality unknown).
Crotalus terrificus Picado, Serpientes Venenosas de Costa Rica, 1931, pp. 43-53, figs. 1 and 14-19.

This large rattlesnake formerly had a range well onto the plateau,

specimens having been obtained some distance east of Cartago. It has become rare or has disappeared largely from plateau country according to Dr. Picado.

The species may be readily recognized by the presence of a series of rattles on the tip of the tail. In the very young specimens only a small button is present.

A specimen, U. S. N. M. No. 13534, from San José, Costa Rica, has been examined. The scale formula is 26-25-25-19; ventrals 172, subcaudals 25; the first, and last three subcaudals are divided, others single; 14 infralabials; four rows of scales between labials and eye; internasals and prefrontals present; supraoculars large, separated anteriorly by two scales, posteriorly by five scales; 25 scales across head between last supralabials.

Genus LACHESIS Daudin

Lachesis Daudin, Histoire Naturelle des Reptiles, vol. 5, 1803, p. 349.

Genotype: *Lachesis muta* (Linnaeus.)

A single species is known to occur in Costa Rica.

Lachesis muta stenophrys Cope

Crotalus mutus Linnaeus, Systema Naturae, vol. 1, 1766, p. 373 (? Surinam).

Lachesis stenophrys Cope, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, 1876 (1875), p. 152 (Sipurio, Costa Rica).

Lachesis muta Picado, Serpientes Venenosas de Costa Rica, San José, Costa Rica, 1931, pp. 37-43, figs. 10-12 (Río Banana).

This large Bushmaster or Cascabela muda seems to be a rare snake in Costa Rica. It reaches a greater size than any other of the poisonous snakes of the country. Picado shows a photograph of a specimen 2150 mm. in length.

This species may be recognized by the following characters: rostral triangular, broader than deep, the muzzle short and depressed; nasal divided; scales on top of head flat, hexagonal and faintly keeled; 12 series of scales between the supraoculars which are of moderate size, but narrow; nine supralabials, of which the third is largest; second low, separated from the pit; pit bordered by three scales, the superior of which borders the two preoculars; the inferior, wider, stands on the third labial and the anterior, which is subcrescentic, and rests on the second supralabial; four rows of scales separate orbit from labials; infralabials 13, first and second touch chinshields; only one pair of chinshields, squarely truncate anteriorly, narrowly rounded behind. Ventrals 200; subcaudals 49 (32 double, 17 quadruple); caudal spine well developed.

Color in preservative, fawn-brown with 23 reddish-brown medium rhombs on the dorsal region. The lateral corners of these are dark spots, sometimes isolated and do not extend below fifth row of scales; on middle of body rhombs with pale centers; posteriorly they are darker and become confluent into a zigzag band. Tail dark brown, with narrow, light cross-bands. Lower surfaces greenish yellow except throat and chin which are white. A black band extends from eye above labials, and is broken upon neck into a series of black spots. Top of head uniform brown.

Boulenger has placed Cope's *L. stenophrys* in the synonymy of *L. mutus*. However the very low ventral count (Boulenger gives 200-230 throughout the range with counts of 202 and 206 for Panamá [200 for type of *stenophrys*] and higher counts 223-226 for contintental South America) suggests that it should be considered a separable form. Also there are some differences in color and pattern.

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